BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

October 20, 1954

PROPERTY OF NMOCC Santa Fe

IN THE MATTER OF:

CASE NO. 727, 728, Consolidated

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
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ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Hobbs, New Mexico
October 20, 1954

IN THE MATTER OF:

Application of the Commission, upon its own motion to consider an order amending, revising, or abrogating existing rules and regulations of the Oil Conservation Commission, and/or promulgating additional rules and regulations relating to gas pool delineation, gas proration, and other related matters affecting or concerning the Blinebry Gas Pool, Lea County, New Mexico.

The order contemplated will pertain to gas pool delineation, gas proration, gas well spacing, gas well allowable, gas proration units and related matters affecting the Blinebry Gas Pool.

Notice is further given that the contemplated order may affect the Terry Blinebry and Blinebry Oil Pools situated in Lea County.

Case No. 727

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Application of the Commission, upon its own motion, for an order amending, revising, or abrogating existing rules and regulations of the Oil Conservation Commission and promulgating additional rules and regulations relating to gas pool delineation, gas proration, and other related matters affecting or concerning the Tubb, Byers-Queen and Justis Gas Pools, Lea County, New Mexico.

The order contemplated will pertain to gas pool delineation, gas proration, gas well spacing, gas well allowable, gas proration units and related matters affecting the following designated gas pools situated in Lea County: Byers-Queen Gas Pool, Justis Gas Pool, Tubb Gas Pool.

Case No. 728

CONSOLIDATED

TRANSCRIPT OF HEARING

MR. MACEY: The next case on the docket is the consolidated cases, 727 and 728. In order to save time I would appreciate it if all the witnesses would stand to be sworn at this time.

(Witnesses sworn.)

MR. MACEY: Mr. Malone will you proceed, please?

MR. MALONE: May it please the Commission, Gulf Oil Corporation has caused certain studies to be made of the area involved in these consolidated cases, on the basis of which it will recommend to the Commission the retention of the Blinebry Gas Pool, the Terry-Blinebry as an oil pool, and the Blinebry Oil Pool, with certain minor modifications of the horizontal limits of those pools. We will now present testimony on the basis of which those recommendations will be made to the Commission. I will ask Mr. R. L. Boss, the first witness to take the podium and the microphone.

R. L. B O S S

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. MALONE:

Q Will you state your name to the Commission?

A R. L. Boss.

Q Where do you live?

A Roswell, New Mexico.

Q By whom are you employed?

A Gulf Oil Corporation, Fort Worth Production Division.

Q You have testified before the Commission on previous occasions, have you not?

A I have.

Q And, have had a change of position since your last testimony?

A That is correct.

Q What is your present position with Gulf, Mr. Boss?

A I am an Assistant Zone Exploration Manager of Zone 8, which comprises the eastern half of New Mexico, and twelve adjacent counties in Texas.

Q How long have you been employed by Gulf Oil Corporation, Mr. Boss?

A Oh, slightly over 26 years.

Q What part of that time has been spent in New Mexico?

A Sixteen years.

Q You have been familiar with the development of the oil and gas pools in southeastern New Mexico during that period of time?

A Yes, sir.

MR. MALONE: Are the witness's qualifications satisfactory to the Commission?

MR. MACEY: Yes, they are.

Q Have you made a study of the geological conditions in the area of the Blinebry Gas Pool which is the subject of this hearing?

A I have.

Q What was the purpose of that study, Mr. Boss?

A The primary purpose was an attempt to resolve the possible discrepancies that might exist in the several pools now designated as the Blinebry Pools.

Q Have you prepared an Exhibit which delineates those present pools in the Blinebry?

A Yes, sir.

Q Will you refer to that Exhibit as Exhibit 1 and explain it to the Commission, please?

(Marked Gulf Oil Corporation's Exhibit No. 1, for identification.)

A Exhibit 1 is merely a map showing the - on which are shown the Blinebry Gas Wells, the Tubb Gas Wells, The Blinebry Oil Wells, and the Terry-Blinebry Oil Wells.

Q Would you trace the delineation of those pools on the Exhibit?

A The pool boundaries are indicated in representative colors as indicated by the legend. The green area is the Terry-Blinebry Pool; the yellow boundary is the Tubb Gas Pool; the red boundary is the Blinebry Gas Pool; and the brown represents the Blinebry Oil Pool. In addition, we have a trace of the cross section that will be introduced as a subsequent exhibit, showing its course through the Blinebry area.

Q When, if you know, was the discovery well in the Blinebry Gas Pool drilled, Mr. Boss?

A I believe the Blinebry gas distillate pay was early in '45, was the first well completed in that pool.

Q When, if you know, was the discovery well in the Terry-Blinebry Oil Pool completed?

A It was completed in 1952.

Q Is Gulf Oil Corporation the owner of or interested in acreage in those pools?

A Yes.

Q Can you state approximately what percentage of the acreage

in the pools is owned by Gulf, or in which they are interested?

A Approximately 20 to 25 per cent.

Q You referred to a trace which is carried through Exhibit 1, of a cross section, will you refer now to Exhibit 2 which is the cross section?

(Marked Gulf Oil Corporation's Exhibit No. 2, for identification.)

A Exhibit 2 is merely a north-south cross section through the Blinebry pools from the northern extremity in the Terry-Blinebry pool through the major gas pool and terminates at the southern extremity with a Blinebry oil well. It merely shows the correlation of diagnostic marker horizons through the area and shows the relation of the Blinebry zone to upper and lower markers. Also, on the Exhibit are shown the present vertical limits of the Blinebry zone as defined by the Commission Order 464.

Q What are the present defined vertical limits of that pool as defined by that Order, Mr. Boss.

A The limits are referred to horizon here, which on this cross section is indicated as top Blinebry, which corresponds to the Blinebry marker in the order and the zone, the vertical limits refer to this datum or 75 feet above this marker to 300 feet below it. The section shows the point at which this marker curves in the section. It is readily recognized throughout the field and offers an easily, an unquestioned horizon that nearly everyone can trace with no difficulty. It also represents the top of the major pay of the Blinebry zone. The upper hundred feet, or the hundred feet immediately below that horizon is generally the most porous and permeable of the entire section now

assigned to the Blinebry pay.

Q Is that up 100 feet the producing section, whether production of oil or gas is encountered?

A Generally so. The major gas distillate production through the Blinebry Gas Pool and the oil production in the Terry-Blinebry Oil Pool are found within that limit.

Q Before proceeding from Exhibit 2, Mr. Boss, would you state how the Blinebry marker is identified by the Order of the Commission?

A The Order refers to a specific point in a specific well. The Humble State well No. 20, located in Section 2 of 22 South, 37 East, is the key well and the Blinebry marker is referred to at a specific depth. I believe it is 5,947 feet. In order that you might have an exact point for your further reference to that horizon that specific well and location is used. That horizon here is the identical one as referred to in the order.

Q I understood you to say that the well at the north and south extremity of the cross section were both oil wells and the remaining wells gas wells, is that correct?

A That is not entirely correct. The northern most well is the Gulf No. 31, Harry Leonard, which is a Blinebry well. The remaining two, three, four, and five, are gas wells with the exception of four, which is a Drinkard well. We have used that because that section was cored entirely from the Glorietta into the Drinkard pay. We used that in subsequent exhibit and testimony.

Q Will you point out each of the six wells on Exhibit 1 on the trace.

A The northern-most well is the Gulf No. 3, Leonard A Blinebry producer in the Terry-Blinebry pool. Number 2 is the Gulf No. 4, Eubanks, a dually completed Blinebry producer in Section 22, 21-S, 37-E. Well number 3 is Gulf No. 6, Owen, a dual producer in Section 34, 21-S, 37-E, Blinebry gas. Number 4 is the Gulf No. 4, Hughes, located in Section 14, 22-S, 37-E. Number 5 is the Gulf No. 5, Vivian, in Section 30, 22-S, 38-E, Blinebry gas well, and number 6 is the Gulf No. 1, Pike, Section 6, 23-S, 38-E, a Blinebry oil well.

Q Does the information from which Exhibit 2 was prepared and the study which you have made of the geological conditions indicate that the producing zone is continuous through those five wells on the cross section?

A The zone can be correlated entirely through the field, yes; particularly this uppermost unit.

Q What is your opinion as to whether or not all of those wells are producing from a common reservoir?

A There seems to be little question that the wells in the Blinebry gas pool and the Terry-Blinebry oil pool are a common source of supply.

Q Will you now refer to Exhibit 3 and state what is portrayed by this exhibit?

(Marked Gulf Oil Corporation's Exhibit No. 3, for identification)

A Exhibit 3 is a structure contour map, subsurface map contoured on the top of this Blinebry horizon Blinebry marker. It depicts the structure at that level throughout the Drinkard, throughout the Blinebry pools. In addition, we have outlined

certain other characteristics of these pools. The area encompassed by the dashed red line is the assumed productive limit of the Blinebry pay.

Q Will you outline that area as shown on the Exhibit?

A It is this area which rims the shaded area both the green and the pink in this Exhibit. This represents our interpretation of the productive limits of this Blinebry pay and it, in effect, represents a porosity pinch-out. This data from which this was obtained comes from nearly every type of information, from electric logs, from sample logs, from core data, and from drill stem test data, and from production records.

Q Mr. Boss, was that Exhibit and the other Exhibit from which you were testifying prepared by you or under your personal direction.

A It was.

Q Will you continue.

A While we say this is an assumed productive limit, it is still substantiated by considerable fact. There are a number of wells around the periphery here there we have evidence that the porosity in this uppermost zone was pinching out from core data, from well performance or from other drill stem tests and production data. We have wells that might show a slight indication of gas or oil in this zone, and immediately adjacent or within a reasonable distance, a well which either tested and failed to encounter any show in the zone, or was dry entirely. So that, in general, it might be said that while it isn't an exact, of course, does not represent the exact limits, it nevertheless is a reasonable conclusion based on the available evidence.

Q You referred to the manner in which the western boundary of the assumed producing area was delineated. What about the eastern boundary?

A We generally have more control along the eastern side. The control wells are closer spaced on more comprehensive data. Along the southwest margin we have relatively little control and that is the weakest part of this assumed limit.

Q What is the reason for that?

A There have been few wells drilled out here from which data was available.

Q You refer to the loss of porosity is there anything further that you care to testify to in that connection?

A In the Terry-Blinebry oil field we have some supporting data from oil-water relationships. Several of the wells here are making water, or have made water, which gives us a further check on this limit. From these data it appears that there is an oil-water contact approaching a minus 2,470 sub-sea, which is very close to this assumed porosity limit here which gives a double check more or less as to the productive limits of this pool.

Q Now I understand then that the delineation on Exhibit 3 of the north boundary of the Terry-Blinebry oil pool is on the basis of the oil-water contact point?

A Not entirely, but it substantiates it.

Q Will you refer now to the pink shaded portion of the Exhibit and state what it represents?

A The area shaded in pink represents the portion of this productive area in which the reservoir contains gas or gas distillate. The green area represents that portion which contains oil.

The boundary, the separating line, the heavy green line which you probably can't see, is the approximate gas-oil contact which was determined from data available in wells on both sides of that line. It separates, then, the fluids in this common reservoir with the oil being down dip at the lower structural position and the major portion of the reservoir containing the gas and gas distillate.

Q Is there any oil production in the pink shaded area which you have designated as the gas producing portion?

A Yes, the area shaded in pink includes what is now defined as the Blinebry Oil Pool. These wells are scattered through a considerable area here and represent erratic marginal producers. In nearly every instance they were drilled to a deeper objective and failing to find commercial production were plugged back and were salvage operations. In general they appear to be producing from possibly lower in the section. It could be interpreted as possibly a separate reservoir, but from the performance of these wells it appears that they are not closely related to this main Blinebry pay. In the original preparation of data for the gas pools in 1951 the Humble Oil and Refining Company compiled data with respect to the Blinebry pools. It was the result of their findings on which the original definition of the Blinebry Gas Pool and the Blinebry Oil Pool were set up. In this report they pointed out that, at that time in 1951, there were 12 of these erratic oil producers which had been completed, and that all were marginal as of that day, averaging approximately 11 barrels per day. It was their conclusion that it was unlikely that the Blinebry Gas Pool was a gas cap of this oil pool from which these scattered wells were producing, but pointed out further that if later information

should indicate that they were, it seemed highly improbable that the production of both the gas area and the oil as separate pools would not be detrimental to the recoveries of oil from the Blinebry oil wells. With the additional information we now have from the performance of the Blinebry pool it bears out the conclusions that Humble proposed or drew at that time, which rather pointedly assures us that there seems to be a little relationship between Blinebry oil wells and the Blinebry gas and gas distillate reservoir.

Q Based on information that was available at the time of that original Humble study and the reservoir performance since that date, Mr. Boss, what is your opinion as to whether or not that the Blinebry gas pool is a producing gas cap of the Blinebry oil pool?

A It would be my opinion that, although the entire zone is called a common reservoir, that in all probability the uppermost permeable or porous unit from which this gas is produced is not a gas cap of the Blinebry oil wells, but definitely appears to have that relationship with the Terry-Blinebry oil pool.

Q Do I understand from Exhibit 3 that the areas of gas production are generally shown in pink and the areas of oil production, other than the marginal Blinebry wells, are shown in green?

A That is correct.

Q And the relationship between those two areas then is as the green area relates to the pink area on Exhibit 3.

A That is true. It indicates graphically the considerably greater extent of the gas pool as compared to the oil pool.

Q With reference to the delineation of the boundary between the Blinebry gas pool as you have designated it and the Terry-

Blinebry oil pool, did you testify that that line was drawn on the basis of the gas-oil contact point?

A This line was drawn, yes.

Q Will you refer now to Exhibit 1 showing the boundaries of those pools as presently delineated by the Commission and state how the two compare?

A The Terry-Blinebry pool as shown in green here, and the Blinebry oil or gas distillate pool outlined in red, is shown to overlap here along the northern boundary. There is, as presently defined, a half mile overlap in those two pools. Since the pools can be fairly well defined on the basis of a gas-oil contact, it would seem more reasonable to change or modify the present limits so that they would not overlap, since they are the same reservoir. Possibly there should possibly be a gap between the two in order that future wells drilled in the intervening area, depending on the outcome of them, the limits of the pools could be adjusted accordingly. So it would be my recommendation that the upper limit of the gas pool be changed so that it would not overlap the present defined limits of the Terry-Blinebry oil field.

Q Is there anything further with reference to your study or the Exhibit concerning which you wish to testify, Mr. Boss?

A I believe that covers everything that I had prepared.

MR. MALONE: That concludes the direct examination of the witness.

MR. MACEY: Are there any questions of the witness?

CROSS EXAMINATION

By MR. STANLEY:

Q Could some of the distillate produced with the gas be

classified as a dark oil or that it is being produced from an oil reservoir that may be separate from the primary gas reservoir?

A Did you say can it, or does it?

Q Could some of that distillate, so called in your testimony, being produced with that gas be also classified as dark oil production?

A I would think it would be possible.

MR. STANLEY: That is all.

MR. MACEY; Anyone else have a question of the witness?

MR. DIPPEL: May it please the Commission we are not sure whether we want to ask this witness any question or not, and we will not be sure until we have an opportunity to examine the exhibits. For that reason we would like to reserve the privilege of cross examination until perhaps afternoon to give us an opportunity to look at them during the noon hour. We may not have any cross examination, but we just simply don't know at this time.

MR. MALONE: Mr. Boss will be available.

MR. MACEY: Immediately after noon you would have the right of cross examination of Mr. Boss if you so desire.

MR. DIPPEL: Thank you.

MR. MACEY: Anyone else have a question of the witness now or later? Mr. Boss, I want to make sure I understand your testimony. As I understand it you maintain that there are two distinct reservoirs. The pink and green, so called, area being one reservoir?

A That is correct.

MR. MACEY: The old Blinebry oil pool down on the Eunice trend being the second reservoir, is that correct?

A That is correct. The evidence to say that the old

Blinebry is a separate reservoir is not as conclusive as the evidence that these are the same reservoir. Let's put it that way.

MR. MACEY: In other words, you are virtually positive that this is a common reservoir, the oil and the gas zone on the north end is a common reservoir, but there is a possibility that the old oil pool is a distinct reservoir?

A That is true.

MR. MACEY: If these two zones are a common reservoir, why not the name, why retain the Terry-Blinebry name, why not call it the oil wells in the Blinebry Gas Pool and rename the other old Blinebry pool?

A If it would not affect the production as presently allotted in the Terry-Blinebry pool I do not believe there would be any objection to that.

MR. MACEY: We could provide for that in the pool rules with some system of allocation. I was thinking of the possibility of having two pools which we say are common sources of supply and they are, therefore, one pool and we probably ought to name them as such.

A In the studies that were made by the committees of which I was chairman, the Delineation Committee, it was our recommendation at that time that those be considered as a common pool, but consideration be given to the Blinebry wells.

MR. MACEY: I have one other question. You may have stated it and I probably missed it. Are the present vertical limits of the Blinebry Gas Pool, are they adequately defined by the Commission in this.

A Yes.

MR. MACEY: You think they are getting the job done?

A Yes, I think it more than inclusive. It wouldn't have needed to have extended as deep in the section as they are presently prescribed.

MR. MALONE: You also testified, did you not, that it was an arbitrary 75 feet above the Blinebry marker?

A That is true. I think that was a conciliatory gesture because some of the wells that had been producing had perforated a little above the marker and to make them legal they put that in. Actually, there seems to be little doubt that there is any production up there because it comes from a sandy sequence that has very little porosity or permeability, so that it did no harm to put it up there. Whereas, actually, the permeable and productive zone is approximately from the marker and beneath it.

MR. MACEY: One other question, Mr. Boss, in connection with what I call the old Blinebry Oil Pool, based on the information that you have right now, do you think that there is any possibility of the withdrawal from the Blinebry Gas Pool damaging the old Blinebry Oil Pool reservoir?

A No, I don't. Our next witness will point some very conclusive data with respect to that particular phase.

MR. MACEY: All right. Any other question of the witness? If not, the witness may be excused.

(Witness excused)

MR. MALONE: We will offer in evidence Gulf's Exhibits 1, 2 and 3, if the Commission pleases.

MR. MACEY: Is there any objection to the introduction of Gulf's Exhibits 1, 2 and 3? If not, they will be received in evidence.

MR. MALONE: The next witness will be Mr. John Ross.

JOHN ROSS

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. MALONE:

Q Your name is John Ross?

A Yes.

Q Where do you live?

A Fort Worth, Texas.

Q By whom employed?

A Gulf Oil Corporation.

Q In what capacity?

A I am a reservoir engineer, in charge of the reservoir engineering activities of the Fort Worth Production Division of the Gulf Oil Corporation.

Q You have been employed by Gulf for how long?

A Approximately seven years.

Q You have testified before this Commission on previous occasions?

A I have.

MR. MALONE: Are the witness's qualifications satisfactory to the Commission?

MR. MACEY: They are.

Q Have you, in preparation for this hearing, Mr. Ross, caused an engineering study to be made of the Blinebry Gas Pool and the adjacent pools as delineated by the Commission?

A I have.

Q Based on that study will you state generally the history

of these several pools?

A I will sir, I would like prior to that to make one statement off the record.

(Discussion Off the Record.)

A First I would like to review with you very briefly a little bit of the history of the three reservoirs that are in question, the Blinebry Gas Reservoir, the Terry-Blinebry Oil Reservoir and the Blinebry Oil Reservoir. As of September 1, 1954, twenty-one billion, eight hundred million cubic feet of gas and three hundred fifty-five thousand barrels of distillate had been produced from the gas wells in the Blinebry Gas Pool. The distillate production that is associated with this oil at the surface has a gravity that varies considerably, but generally speaking, has a gravity of about 65 degrees API. During the past 20 months Commission records reflect that the weighted average gas-distillate ratio equaled 51,467 cubic feet per barrel. That is the ratio of distillate to gas. The October, 1954, proration schedule shows that there are 68 wells in the Blinebry Gas Pool, the greater percentage of which were completed during the year 1954. If I remember correctly there were 29 wells as of January 1, 1954, so the pool, the number of wells has increased from 29 to 68 during this year. During 1954, through October, 1954, the average 160 acre gas well allowable has been 585 MCF per day. The Blinebry Oil Pool was discovered, as Mr. Ross said, in December, 1945. During the month of August, 1954, there were only 10 producing wells in the Blinebry Oil Pool. For that month those wells averaged only 7½ barrels of oil per well per day. All wells are marginal and four of the 10 wells require artificial lift. The average producing

gas-oil ratio for the month of August, 1954, was 9,750:1 cubic feet per barrel. The Blinebry Oil Pool as of September 1, 1954, had produced 306,647 barrels of oil and a total of 15 wells had been productive, making an average cumulative production per well of slightly in excess of 20,000 barrels. Here is a field that has been productive since 1945 and the average per well cumulative has been approximately 500 barrels per acre. All wells are marginal, the average current production being approximately 7½ barrels a day. None of these wells were originally projected to the Blinebry formation as oil producers. In general, all were drilled to a deeper depth and, when the lower horizons were found to barren, they were plugged back to oil shows in the Blinebry pay. In general again all production is obtained from the lower portion of the Blinebry formation or below the gas-oil contact. I want to stress now that all wells in the Blinebry Oil Pool are marginal, salvage operations. I further wish to stress that the Blinebry oil pay, as such, could not have been developed by the operators had it not been for the possibly deeper horizons for which the operators projected those particular wells. They are salvage operations.

The first production from the Terry-Blinebry Oil Pool was obtained in March, 1952, and the August Committee report shows that 309,277 barrels of oil had been p roduced as of September 1, 1954. Here is an oil pool within this so-called common reservoir that was discovered in March, 1952, that has already produced more oil than the Blinebry Oil Pool that was discovered in 1945, giving a relative gauge of the value of the two reservoirs. Sixteen wells were producing during the month of August from the Terry-Blinebry Oil Pool when the average per well per day production amounted to 46 barrels.

The weighted average gas-oil ratio for the month of August as taken from the Committee reports averaged 2,150 cubic feet per barrel. Our records reflect that as of October 15, 1954, there were 22 producing wells in this pool. Due to the fact that the rim oil found in the Terry-Blinebry Pool is now indicated to be considerably larger than first anticipated all the information available has been thoroughly reviewed to determine what effect the withdrawal of gas from the Blinebry Gas Pool would have on ultimate oil recoveries from this rim area.

Q Have you made a study, Mr. Ross, as to the relative values of the oil and gas reserves that exist in this reservoir?

A I have.

Q Will you state your conclusions in that regard.

A According to Mr. Ross's Exhibit No. 2, the shaded area in pink represents the Blinebry, the possible Blinebry gas pay. The shaded area in green represents the Terry-Blinebry oil pay. The Blinebry oil pay is not shown on that exhibit because we consider that to be negligible marginal salvage oil. Inside the porosity limits on Mr. Ross's Exhibit No. 2 there are 30,700 acres, of which 27,500 are estimated to be productive of gas and distillate from the Blinebry gas field; 3,200 are estimated to be productive of oil from the Terry-Blinebry oil field. Six hundred acres are estimated to be productive of oil from the Blinebry oil pool. Therefore, approximately nine times as much of the total acreage will be productive of gas and distillate as will be productive of oil itself or 90 per cent of the total acreage will be gas acreage. However, because an acre of oil has a greater value than does an acre of gas we do not feel that a relationship between acreage is a fair estimate

of whether you have primarily a gas reservoir or an oil reservoir. For that reason we determined recoverable reserves for the three pools in question. To those recoverable reserves we have assigned current day prices and have determined the total value and the ratio of the values between said reservoirs. As a result of that investigation we found that with respect to total revenue as of the first of October, 1954, 81 per cent of the money to be gained from the producing of these formations will be from the Blinebry gas and distillate field; 18 per cent will be from the Terry-Blinebry oil pool; one per cent will be from the Blinebry oil pool. This comparison of revenue establishes the fact that the Blinebry formation is primarily a gas reservoir, both regarding acreage and regarding revenue. However, it has always been Gulf's policy to conserve associated gas if the production of same will be detrimental to the associated oil ultimate recovery, regardless of the relative value between the associated gas and the oil. Since the geological evidence previously submitted definitely indicates that the Blinebry gas is in association with the oil around the rim of this structure the effect of withdrawing this gas cap on ultimate oil recovery has been investigated.

Q What would be the normal result of such a withdrawal, Mr. Ross?

A If oil is found in a reservoir, and we will talk now about an average reservoir, if oil is found in a reservoir having a gas cap and the pressure of the gas cap is reduced faster because of withdrawal rates, than the pressure in the oil pay, expansion will occur so that the oil will migrate into the gas cap area. If this occurs only a very small portion of the oil that does migrate into

the gas cap area will be productive. This results in reduced recovery efficiency for the oil reservoir. In addition, gas caps may add reservoir energy and actually increase ultimate oil recovery if the gas cap is effective as the driving mechanism to aid the solution gas drive mechanism within the oil portion of the reservoir itself.

Q Have you prepared an exhibit showing comparable bottom hole pressures in the Blinebry formation?

(Marked Gulf Oil Corporation's Exhibit No. 4, for identification.)

A Yes, Exhibit No. 4 is a map showing the current delineation or the current boundaries of each of the respective fields, in red representing Blinebry gas, brown representing Blinebry oil, green representing Terry-Blinebry. On this map are posted the latest bottom hole pressure information available from these three reservoirs. The figures shown in green represent Terry-Blinebry bottom hole pressures. The figures in red represent according to the field limits, represent Blinebry gas pool bottom hole pressures. The figures in brown represent Blinebry oil bottom hole pressures. These pressures were all taken during the months, I am speaking now of all pressures, were taken in general during the months of September and October, 1954. They were taken at a datum of minus 2400 feet sub-sea and they were all taken after approximately the same amount of shut-in time. Therefore, from a datum shut-in time, date viewpoint, these pressures, relatively speaking, can be compared. It is very interesting to note that on this Exhibit the arithmetic average of the 18 wells from which pressure measurements were made in the Terry-Blinebry oil pool, the arithmetic average

pressure was 1,512 pounds per square inch. The arithmetic average of five of the seven red gas bottom hole pressures was 2,201 pounds per square inch.

Q Will you indicate the location of the wells to which you just referred, please?

A The five wells in the Blinebry gas field are more or less scattered and we feel are scattered representatively throughout the field. Therefore, there is a pressure in the gas of 2,201 pounds per square inch, a pressure in the oil column of 1,512 pounds per square inch, or a delta P or A pressure differential of 684 pounds. This pressure differential exists according to Mr. Boss's statement in a common reservoir. Now, with such a pressure differential within the reservoir it would not be possible for the oil in the oil rim to expand into the high pressure area, or the gas area. Therefore, with the pressure differential in favor of the oil column there can be no expansion of oil, no waste of oil from the rim into the gas cap. Therefore, withdrawals from the gas cap to date have not permitted a pressure situation such that oil can migrate into the cap and be lost. This very definitely indicates poor communication between the oil rim and the gas area. If the communication between those areas were good with this oil field being a relatively new field with relatively little withdrawals from the gas field, hydrocarbons would have redistributed themselves throughout the area and pressure would have been maintained in the oil area. The reason the pressure differential has occurred, theoretical calculations show that the withdrawals per acre foot from the Terry-Blinebry oil pool have been greater than the withdrawals per acre foot within the gas reservoir.

Because of the greater withdrawals per acre foot, poor communication between, there is less pressure in the Terry-Blinebry oil. Now, by the same token, since such poor communication is indicated this huge gas cap hasn't been very effective in adding ultimate oil recovery here. Since it hasn't been in the past, we don't feel it will be in the future. Therefore, we think that the withdrawal of gas and distillate from the Blinebry gas field will not effect in any way the ultimate oil recovery from the Terry-Blinebry oil pool, and we see no reason then why they should be produced as a common reservoir, since evidently they are behaving as separate reservoirs. That is the basis of our recommendation that we maintain everything as is, with a few minor changes.

Q Have you made a study, Mr. Ross, of the pressure performance of the Blinebry formation during the period from '46 to '54?

A Yes. Before I go into that I would like to point out another thing on this particular exhibit, if I may?

Q Go right ahead.

A This Exhibit has, in brown, the bottom hole pressures of the Terry-Blinebry pool, the average of which is equal to 1,199 pounds. Therefore, there is a pressure differential between the Blinebry oil pressure of 1,199 and the Blinebry gas pressure of 2,201, there is a pressure differential there of approximately a thousand pounds. Now generally speaking, this oil in this area underlies the cap and, if that cap were very effective, certainly there couldn't be a 1,000 pound differential between the two. Furthermore, had this cap been the Blinebry oil it wouldn't, or couldn't be classified as marginal salvage, the recoveries would certainly have been greater than 500 barrels per acre during

a ten year producing life. Therefore, it is our contention that the pressure performance, or the current pressure information, indicates that the Blinebry cap or the Blinebry gas field isn't effective with respect to ultimate oil recovery in the Blinebry oil field. I want to point out one more thing on this Exhibit. We have on this Exhibit a Blinebry oil well pressure of 937 pounds, offset by a Blinebry gas-oil pressure of 2,041 pounds. I want to point out something else. This additional performance history verifies the conclusion reached by Humble in 1951, when at that time they said it was their opinion that the gas cap would not effect the ultimate oil recovery from the Terry-Blinebry oil pool. Additional performance still verifies the original assumption upon which the rules were based for this particular area.

Q Will you proceed then with your study of the pressure performance of the formation?

(Marked Gulf Oil Corporation's Exhibit No. 5, for identification.)

A Exhibit No. 5 is another exhibit showing pressure information. Exhibit No. 5 shows the pressure performance within the Blinebry formation from the years 1946 through 1954. In other words, this is the history of the pressure performance, whereas this was the current status of the pressures within the reservoir.

Q Will you take the pointer and follow the curves because they are not visible to the audience?

A Again, we have used the same color scheme. Red refers to the Blinebry gas, green refers to Terry-Blinebry oil, brown refers to Blinebry oil. We have two type pressures shown for the Blinebry gas. The upper line, or the line connected with the

triangles, represents bottom hole pressures. The first pressure shown was the pressure taken on Gulf's Vivian No. 5 soon after that well was completed in the year 1949. That pressure was 2280 pounds per square inch. The next point on the bottom hole pressure curve for the Blinebry gas field represents bottom hole pressure measurements on seven wells, the same pressures that were shown on the previous exhibit and the arithmetic average of those pressures is 2201 pounds. This red line then has declined in pressure 179 pounds. So this Exhibit says that the bottom hole pressure in the Blinebry gas formation has dropped 179 pounds. In order to know whether or not any of that information is representative we have examined all surface pressures taken on gas wells. The reason we did that, we have so many more pressures to work with because normally that is the pressures that we have taken in the past on gas wells. For example, the last point on the lower red curve includes 53 surface pressures. Naturally it would be much more representative of the reservoir as a whole than the point of seven pressures. You will note that the two red lines have essentially the same slope. You will note that the indicated surface shut-in pressure has declined approximately the same rate as has this bottom hole pressure. That indicates to us then that the upper line, or the bottom hole pressure line, which we want to relate to the bottom hole pressures in the other fields, is a fairly representative curve. Theoretical calculations from this approximate 750 pound shut-in pressure converting that surface pressure to a datum of minus 2400 feet, puts that point almost exactly upon this point, calculating gas distillate, gradients, gravities, etc. Therefore, we show this lower curve only to show that we feel that

the upper curve is representative of the gas reservoir. As I stated, the bottom hole pressure, the gas reservoir has declined 179 pounds per square inch. By the same token, the bottom hole pressure in the Terry-Blinebry oil pool, and these pressures, generally speaking, represent all of the wells that were completed at that particular time, the bottom hole pressure in the Terry-Blinebry oil pool has declined 753 pounds per square inch. Therefore, while the bottom hole pressure in the gas pool has remained essentially level the bottom hole pressure in the Terry-Blinebry oil pool has declined, relatively speaking, very rapidly. It has declined very rapidly considering that there is a gas cap that could perhaps be effective.

Q That decline has occurred over what period of time in the Terry-Blinebry oil pool?

A Over a period of two years.

Q Go ahead.

A From this you draw the same conclusions that you could draw from this other curve, a pressure differential exists, the gas cap is not effective, withdrawals of gas from the gas cap will not hurt the recovery of the oil from the associated oil rim. Again the same comparison exists between the red and the brown, the brown being the salvage Blinebry oil well pressures. I want to explain an increase here in bottom hole pressure, if I may. All pressures except the last pressure were taken at a datum of minus 2200 feet, with close in times, ranging from 24 to 48 hours. The final point has only five wells, was at a datum of 2400 feet, close in time, 72 hours, and that explains the reason that it is somewhat higher than some of the prior pressures; deeper, longer closing time.

Again you have a pressure differential between these two reservoirs which is approximately 1,000 pounds. The fact that the available pressure data indicates that this relatively large gas cap is having no effect on the associated oil would be very difficult to explain if core analysis were not available. However, we do have core analyses that reflect, relatively speaking, very low permeabilities throughout the Blinebry formation. Furthermore, the core analyses show that the permeabilities and porosities decrease as the edge or the rim of this reservoir is approached.

Q Have you made a study of available information on the porosity and permeability?

A Yes.

Q Which exhibit is devoted to that study?

A Exhibits 6, 7 and 8.

(Marked Gulf Oil Corporation's Exhibits 6, 7 and 8 for identificatio

Q Will you state what Exhibit 6 shows?

A It is a core graph of the Blinebry formation from the Gulf Oil Corporation Hugh Well No. 4, located in Section 14, Township 22-S, Range 37-E. That is shown by the yellow circle on Exhibit No. 4. This particular well is located, generally speaking, in the center and in the, what we might call, the fat portion of the gas reservoir. We feel that this particular core is fairly well representative of the good gas distillate zone. If you will recall on Mr. Boss's cross section, Hugh No. 4 was one of the top structural wells in the center of the cross section. This core graph gives the results of permeability and porosity measurements at every foot throughout the entire 471 feet of the Blinebry

section. The well was cored from the Blinebry marker Mr. Boss referred to in his previous testimony. It was cored from that marker to the base, or to the top of the Tubbs sandy section. As a matter of fact, this particular well was cored from the top of the Glorietta through the Vivian section of the Drinkard, a continuous core. Zone porosity measurements on this core graph are shown in blue. Can they be seen from the audience, the blue line? The permeability measurements are shown in yellow. The scales for the permeability goes from zero to 100 millidarcies. The porosity scale goes from zero to 40 per cent. The yellow line, or the yellow curve, represents permeability in millidarcies. The blue curve represents porosity in per cent. In addition, superimposed upon this core graph is a Schlumberger log, the same log that was used by Mr. B s s on his cross section. Zone 1, which Mr. Boss stated was the major zone or the prime zone, or the zone containing the best porosity within the Blinebry in this well exists from 5452 to 5557 feet, that was the only zone that during drill stem test throughout this whole interval, that was the only zone, or Zone 1, that tested any fluid on drill stem test. It produced gas to the surface in 12 minutes and I do not recall the drill stem test, but it was gas productive. Below that zone or from 5557 throughout the Blinebry section the core was stained with oil. However, on drill stem test the remainder of the section did not test any oil. Zone 1 then contains 100 gross feet, of which 52½ feet had permeabilities that measured in excess of zero, so that we have what we might consider 52½ feet of net pay. The average porosity for the Blinebry, the weighted average porosity for the next section equals 12.45 per cent. I might add that for dolomite

rock that is, relatively speaking, an average porosity. Perhaps you might say that is a good porosity, 12.45 per cent. The permeability, the weighted average permeability for the section, however, was only 2.76 millidarcies. That I consider to be a relatively tight rock, low permeability. With respect to what we can compare that with, that same well cored to Vivian section was made a Drinkard oil well, the average permeability for the Vivian zone, the average permeability for the net pay was 25 millidarcies as compared to the .76 millidarcy average for the gas pay. So it is, generally speaking, a tight reservoir. Zone 2 on the core graph had 84 feet gross section, 43 feet having permeabilities greater than zero. The average porosity for Zone 2 was 10.33 per cent, the average permeability was 0.82 millidarcies. That low permeability probably accounts for the marginal status of the Blinebry oil wells, most of which have produced oil from this lower zone. The rock is tight. The porosities are fairly good porosities, but it is, the permeabilities are relatively low. Also between these zones of the Blinebry there are very definite zones where there is no permeability at all and where the porosity is very, very small. Those particular zones, we feel, could act as vertical barriers so that gas above one zone with respect to oil below would not actually be in association because of the poor communication, the non-porous, non permeable section between, although that particular section is still dolomite, not a shale break, but porosity pinch-out vertically within the section. Those zones where we have no permeability, little porosity, might explain the fact that there is a thousand pound pressure differential between the Blinebry oil and the Blinebry gas.

Exhibit No. 7 is a core graph of Gulf, Nancy Stevens No. 2 Blinebry. The plotting of this core graph is identical with the plotting of this core graph, with the exception that this core graph has a gamma ray neutron rather than a Schlumberger. This particular well is located in Section 24, 21-S, 37-E. I would like to point out the location of that particular well with respect to Mr. Boss's porosity limits, located slightly to the west of the assumed porosity limit. This well is located near the edge of the field. As Mr. Boss pointed out the porosity limit near this location occurs. After perforating and treating the Blinebry section from 5675 to 5750 with 10,000 gallons of acid, this well tested 82.1 MCF of gas against 20 pounds back pressure. Therefore, it was treated very heavily, produced essentially no gas in commercial quantities. That potential in itself would verify Mr. Boss's porosity limit. However, the core graph also verifies that porosity limit. Examination of the core graph from 5652 to 5763 were still in that same major zone of the Blinebry that Mr. Boss referred to. The completion was attempted in this same major zone 1, shows 116 feet of gross pay of which 46 feet had permeabilities greater than zero. The porosity averages only 4 per cent, and you will remember that we had porosity in excess of 12 per cent. Therefore, porosity does decrease as the limits of the reservoir are approached. The weighted average permeability for the net pay equals only .74 millidarcies. That explains the very low potential for the well. You will also note that these permeabilities on all these core graphs, you never have breaks of large permeabilities like you have in Vivian up to 300 millidarcies, 250 millidarcies. The whole thing is tight all the way through. There aren't any one or two

foot zones of high permeabilities. This low porosity and permeability certainly verifies the assumed porosity limit as designated by Mr. Boss and explains the poor potential obtained on this well. As a matter of fact I don't know, I don't believe that we have completed this well. I think we have temporarily abandoned the gas zone. Bearing in mind that the average permeability of Zone 1 Hugh No. 4, was 2.6 millidarcies, a definite decrease in porosity and permeability occurs as the limits of the reservoir are approached.

Exhibit No. 8 is a core graph of the Blinebry formation from Gulf Oil Corporation's Harry Leonard-A, number 37 Blinebry, located in Section 2, 21-S, 37-E. That well is a producer from the Terry-Blinebry oil pool. It produces from the green area. It is shown by this yellow circle on Exhibit No. 4. So we have cores both in the gas - we have cores in the good portion of the gas field and on the edge of the gas field and in the oil field. We feel that we have representative core data on this reservoir. We have not shown as exhibits all the core data we have. We have shown that core data which we have for wells, complete core data and core data that we feel is representative of all conditions. Other core data we have verifies what we are giving the Commission today. Exhibit No. 8 has the identical method of outlining the core information as the two other core graphs. The core interval of this well represents again the Zone 1 of the Blinebry formation from 5937 to 5950 feet or 113 feet of gross pay. Sixty-two feet had permeabilities greater than zero and the average porosity for this section is 8.73 per cent, so this well has porosities greater than this well, but less than this well. It is approaching the edge

of the reservoir. Again porosities are decreasing. The net average permeability is 1.52 millidarcies. This well on completion required 12,000 gallons of acid and was potential for 68 barrels of oil per day. The core data in summary shows that the Blinebry formation throughout is relatively tight and, as the rim of the reservoir is approached, permeabilities and porosities decrease. Such low permeability evidently has prohibited the pressure equalization between the associated gas and oil, and the results from the core data indicate that the gas cap will have little effect as a driving mechanism upon the associated oil reservoirs. In addition, the core data showed definite zones within the Blinebry formation which are not connected, so that any oil found in the lower portion of the section will not be effected by the upper gas cap. The core data substantiates the assumptions arrived at from the pressure investigation and explains the reason for the pressure differentials that now exist within this reservoir. Because the Blinebry section, with respect to total value or total revenue, is primarily a gas distillate reservoir, and because the withdrawal of hydrocarbons from the gas cap will probably have no effect on the efficiency of the associated oil reservoirs, it is the recommendation of the Gulf Oil Corporation that field rules be established for the Blinebry Gas Pool as if this reservoir were not associated with the others. Such rules will permit the withdrawal of gas from this pool according to market demand, which will in no way decrease the ultimate recovery from the Terry-Blinebry Oil Pool and the Blinebry Oil Pool. It is recommended that these three pools be regulated and prorated then asif they were single reservoirs.

Q You have heard Mr. Ross's recommendation with reference to the northern horizontal limit of the Blinebry Gas Pool. Do you concur in that recommendation, Mr. Ross?

A Yes, I concur with that recommendation.

Q You have referred to recommended field rules and you are familiar, are you not, with the rules which Gulf are presenting to the Commission at this hearing.

A Yes, I am.

Q Those rules differ primarily in two respects from the field rules heretofore established by the Commission, do they not?

A These field rules differ in two sections with respect to the field rules as a result of the order R-520.

Q The first respect in which they differ is the size of the proration unit, is it not?

A That is true.

Q Will you state the recommended proration unit which Gulf is suggesting?

A Gulf is recommending that the standard proration unit for the Blinebry Gas Pool be, or shall consist of 160 acres, or that 160 acres be the basic gas proration unit.

Q Provision is made in the rules for exceptions for larger units, is it not?

A That is true. Provisions are made in the rules for larger units.

Q Do you have any observations that you could offer with reference to the soundness of that recommendation as to 160 acre basic proration unit?

A As you know, Gulf recommended 160 acre proration units

for the shallow gas pools in Lea County, New Mexico. If we recommended 160 acre units for those particular reservoirs, we would certainly recommend no larger than that for this reservoir, being considerably tighter than the shallow gas pools.

Q With the lack of porosity and permeability you consider the smaller unit to be more desirable in this instance?

A I think one well would drain 160 acres, I don't have any doubts about that.

Q Are there, in your opinion, any portions of the Blinebry Gas Pool in which a well might drain in excess of 160 acres?

A There are, yes.

Q Provisions are made for exceptions in such cases?

A Yes.

Q Rule 14 which is included in the proposed rules relates to the definition of a gas well, does it not, Mr. Ross?

A Yes, it does.

Q What is the definition of a gas well which Gulf is recommending?

A The gas well in the Blinebry Gas Pool shall mean any well within the vertical and horizontal limits of the Blinebry Gas Pool producing gas and liquid hydrocarbons, the liquid hydrocarbons having a gravity of in excess of 45 degrees API or producing gas in liquid hydrocarbons, the liquid hydrocarbons having a gravity of less than 45 degrees API and a gas-oil ratio of in excess of 100,000:1.

Q On what basis was that recommendation arrived at?

A Well obviously, with respect to the Blinebry gas field and the Blinebry oil field, operators should be able to produce

what salvage oil can be obtained from the lower Blinebry section and perhaps there are wells already within the reservoir, perhaps there will be wells completed within the vertical limits of the Blinebry reservoir that will produce some crude oil. The gravity of the distillate in the Blinebry gas field varies considerably. We have tried then to define a gas well using a gravity so that if a well produces oil, black oil, having a gravity less than 45 degrees API, that well would be an oil well because it is essentially an oil well. From that point up in gravity, if a well is producing associated fluids having gravities in excess of 45 degrees API from the vertical limits, we feel it should be produced and prorated as a gas well.

Q Is there any particular sanctity to that 45 degree recommendation?

A No. From a fluid analysis in the Terry-Blinebry field we find that the gravity of the Blinebry oil -

Q (Interrupting) Would you speak a little louder?

A We found that the gravity of the Terry-Blinebry oil was 39.9 degrees API. Our records show that the Blinebry oil in general has a gravity of approximately 40 degrees API. Our records also reflect that the Blinebry gas distillate has a gravity of approximately 65 degrees API. Therefore, we just arbitrarily picked 45 degrees API as a limit between the two. It has no basis other than we feel that it is an equitable thing. It is as unfair to one operator as it is to another.

Q Any other further testimony that you are prepared to give in connection with this subject, Mr. Ross?

A No, sir.

MR. MALONE: I would like to correct one inadvertent statement which I think you made in referring to the Humble report. You referred to the possibility at that time of the Blinebry Gas Pool being a gas cap for the Terry-Blinebry Oil Pool.

A I am sorry.

Q You mean to refer to the Blinebry Oil Pool.

A Yes, there are so many Blinebry oil and gasses it is easy to get confused.

Q Were the Exhibits prepared by you, prepared under your direction?

A They were.

Q Have you examined the ones prepared under your direction?

A Yes.

MR. MALONE: We offer Gulf's Exhibits 4,5,6,7, and 8.

MR. MACEY: Any objection to the Exhibits being received in evidence? If not, they will be received.

MR. MALONE: That concludes the direct examination of the witness.

MR. MACEY: We will adjourn until 1 o'clock.

AFTERNOON SESSION
WEDNESDAY, OCTOBER 20, 1954

MR. MACEY: The hearing will come to order, please. Are there any questions of Mr. Ross, the last witness for Gulf Oil Corporation. Mr. Ross, I want to talk to you about something. Did you have some question, Mr. Dippel?

MR. DIPPEL: Go ahead.

CROSS EXAMINATION

By MR. MACEY:

MR. MACEY: Do I understand you correctly when you say that you think there ought to be a buffer zone between the so-called Terry-Blinebry Oil Pool and the Blinebry Gas Pool in this area here?

A Not a buffer zone.

MR. MACEY: A blank area is what I really mean?

A No, sir. I think there shouldn't be an overlapping of horizontal limit there. I think when the field is completely developed the 160 acre gas well unit will be offset with three to four offsetting oil wells at approximately the gas-oil contact.

MR. MACEY: That is what I was concerned about.

A In other words, if you brought down the Blinebry gas limits now to include only that area that is developed there would be a buffer zone between the two, that will be by development the buffer zone itself will be destroyed.

MR. MACEY: I was thinking mainly in terms of the fact that some operators might have fairly large proration units that might extend into what you have got delineated as the oil area. You follow me?

A That is a possibility.

MR. MACEY: You dedicate oil acreage to a gas well?

A That is a possibility.

MR. MACEY: That is all I have.

A If that existed though, you see, that would be the operator's choice of stepping up near the oil pool and drilling his oil well. If he didn't want to do that, that is his business. I mean he would have that privilege if he thought that the oil was there and he wanted to drill it, that would be fine, but that would cut down his gas unit.

MR. MACEY: In other words, an adjacent well on the unit that proved to be an oil well would reduce the size of his proration unit?

A That is right.

MR. MACEY: Mr. Dippel do you have a question?

MR. DIPPEL: Mr. Kellahin will have some questions.

MR. KELLAHIN: Kellahin representing Continental Oil Company.

By MR. KELLAHIN:

Q Mr. Ross, as I understood your testimony it was to the effect that as you go off the structure you tend to lose permeability and porosity?

A The permeability and porosity are indicated to be decreasing as the limits of the reservoir approach.

Q The converse would be true, as you go up structure it would tend to increase?

A That is true.

Q In the lower Blinebry I believe on your core graphs you

indicated an oil separation zone which will not be produced, if I understand your testimony correctly, due to the low permeability, is that right?

A I wouldn't say entirely due to low permeability, no, sir. It would be a combination perhaps of oil storage and permeability.

Q You do have an oil saturation zone indicated?

A That is true.

Q Is it unreasonable then, do you think, to assume that due to an increase in permeability or porosity, as you have testified, and the fact that oil saturation is present in the lower Blinebry, there may be an oil producing zone on the crest of the structure below the gas?

A Yes, that is very possible.

Q You think that is quite possible?

A Yes.

Q Could it, in your opinion, be increased by fracture methods or other --

A Could what be increased?

Q Sir?

A Could what be increased?

Q Could the possibility of oil production be improved?

A Ultimate oil production?

Q Yes.

A That is a question that is controversial. It would depend entirely upon whether by remedial work you could connect porosity or whether you just improved permeability as already connected porosity as whether you would increase ultimate oil recovery

Q You would not discount the possibility of improving that situation?

A I would neither discount it nor would I credit it. Experimentation would be required before you would know that answer.

Q Did I understand in your opinion there is a permeability barrier between the gas zone of the Blinebry and the lower oil saturated zone?

A The core graphs show zones of no permeability and zones of decreasing porosity and the pressure performance verifies that the vertical communication is poor between the two zones.

Q Can you trace that zone completely across the Blinebry?

A Yes, I think that it is fairly distinguishable on the logs and it is also evidenced on the cores that are available, and the pressure performance of the two reservoirs over the area bears it out also.

Q Do you have any recommendations to make to the Commission as to the method of handling as a proration matter oil wells which are completed in the center part of the pool, in the event there are such wells?

A Yes. I think that those oil wells should be prorated according to the same rules that have been in existence for the Blinebry oil wells through the years. I think the field rules that we have recommended, however, revise the gas, gas-oil ratio limit to be increased from 2,000:1 to 10,000.

Q Mr. Ross, have you established a gas-oil contact in the Blinebry?

A You mean between the Blinebry gas and the Blinebry oil pools?

Q Yes. Could you give it to us as a sub-sea datum?

A A gas-oil contact between the Blinebry oil and the Blinebry gas?

Q Yes.

A In the Blinebry Oil Pool?

Q What I am referring to, Mr. Ross, is this period of saturation which we were just discussing.

A All right. No, I could not. We were not able to establish that.

Q You have it for the Terry-Blinebry and the Blinebry?

A Yes.

Q Could you give us that in the sub-sea datum?

A That is at minus - may I look at the Exhibit? Do you know the exact contact, I believe it is 2260.

Q Does this zone 1 that you have referred to in your testimony include within it both oil and gas zones as fixed by that sub-sea data?

A Yes.

Q Do you have any reason for not restricting the gas limits of the gas zone to the gas-oil ratio, to the gas-oil contact?

A Would you ask that again?

Q Do you have any reason for not restricting the limits which you have defined as gas productive to the area above the gas-oil contact? The vertical limits I am referring to.

A The vertical limits?

Q Yes. What I am getting at, perhaps I do not make myself clear -

A Yes, I understand.

Q I am referring to the top of the productive formation down to the first barren zone, in effect.

A In other words, the vertical limits would be from a sub-sea depth to a sub-sea depth, equal to the gas-oil contact.

Q Something to that effect, yes. Do you have any reason for not restricting your zones to that area?

A That would then be designating reservoirs by a contact, which we, in general, just do not recommend.

Q In the case before us here, Mr. Ross, I believe, according to your testimony, it would not necessarily be a contact. I have misled you in that respect. It would be the dense zone which interlies between the two?

A No, sir, that dense zone you see goes, or the dense zone carries gas and then, as your formation in that dense zone dips down structure, it then carries oil.

Q Within the same zone?

A The permeable, porous zone as it dips down structure goes from gas to oil.

Q This dense zone you refer to is not productive?

A Probably not productive, with zero permeabilities.

Q Mr. Ross, one other question. Have you included anything in your proposed orders which would require periodic bottom hole pressure tests as a means of control in the event there is further oil development in this?

A No, sir, not in these proposed field rules, we have not. I do not object to that whatsoever. As a matter of fact, I would recommend that.

MR. KELLAHIN: Thank you very much.

MR. MACEY: Any further question of the witness?

By MR. STANLEY:

Q With reference to the bottom hole pressure data, Mr. Ross, aren't there 54 wells that are dualled in the Blinebry Gas Pool, and only four wells are individual wells producing from that zone?

A I am not sure of those numbers, Mr. Stanley.

Q I think you will find that is approximately correct and, therefore, with a larger majority of the wells being dualled, you would not be able to obtain this bottom hole pressure data accurately, is that right?

A That depends on the dual equipment installed, with which I am not familiar. There is nothing to preclude the bottom hole pressure measurements if the well is a dualled well, if the proper equipment is installed.

MR. MACEY: Any other question? Mr. Montgomery.

By MR. MONTGOMERY:

Q I wish you would explain to the Commission - your testimony recommended that we leave the pool rules and assume they are separate reservoirs and produce them as such, although we know that the development at this time does not approach the gas-oil contact. I wonder if you would explain to us what we might expect down the road as development continues and does approach the gas-oil contact?

A As development approaches this contact, if the operators drill immediately along that contact they will have wells that have both a gas column and oil column exposed in their wells. Depending on their completion methods, the success of their completion methods, they will either have gas or oil, and initially they might have an oil well which will go to very high ratios in the

future. Depending on what an operator gets by this development, he either will get an oil well or gas well by his drilling. It will either produce oil with the gravity of less than 45 API and ratio of less than 100,000:1 and have an oil well, or produce over to 100:000:1 and have an oil well.

Q Could we expect that this might cause oil to possibly migrate up structure?

A Not as long as there is a pressure differential between the two in favor of the gas reservoir.

Q But it is possible that down the road, as more gas wells are drilled near this contact, it is possible that we will not continue to have the pressure differential that we had today?

A My opinion there is that the Terry-Blinebry development has been so rapid, probably will continue at a fairly rapid pace, that withdrawals per acre foot to date have been more than from the Blinebry gas field. My opinion is that the withdrawals per acre foot in the Terry-Blinebry oil field will continue to be higher than in the Blinebry gas field. We have no pressure equalization to date. I would expect the pressures in the Terry-Blinebry oil pool to continue to climb according to the last pressure trend. I also expect the pressures in the Blinebry field, I expect that pressure performance in the Blinebry gas field will not decline radically.

MR. MONTGOMERY: Thank you.

MR. MACEY. Any other question of this witness? Mr. Ross, your qualification as to whether a well is an oil well or a gas well, depending on the gas-oil ratio, wouldn't the gas-oil ratio depend a lot on what the line pressure was at the time that you

took the gas-oil ratio test? You might have a gas well one month and an oil well the next month.

A Are you speaking about gas-oil ratios with respect to gas wells or oil wells?

MR. MACEY: I am talking about the establishment of whether a well is a gas well or an oil well by the use of a gas-oil ratio limit.

Q I see.

MR. MACEY: One month you may complete a well near the contact and you may have a well that is a gas well. If the line pressure drops and you get more oil coming into the bore hole, you may have an oil well the next month. Then you have got a question of withdrawals, of how much oil you are going to allow there. What are you going to do about that?

A I could foresee having an oil well originally, going to a gas well. It is very difficult for me to see having a gas well go into an oil well. The characteristic KG/KO are such that that would be most uncommon. With depletion your KG/KO characteristics become such that your ability for oil flow decreases with respect to your ability for gas flow. I can't see, right at this moment, any opportunity of a well initially producing gas and at a later date producing oil. I can see an oil well, completed as such, at a later date becoming a gas well. That, I think, has occurred in the area of the Terry-Blinebry pool already, but I can't see the possibility there that you question me about, no, sir.

MR. MACEY: Do I understand you correctly that you don't recommend any changes in the vertical limits of any of the existing reservoirs?

A No, sir. If I remember correctly, the Gulf Oil Corporation, when these rules were originally recommended, the Gulf Oil Corporation approved them. If I remember, when they were revised last spring, I forget the exact time, we had no objection and we have no objection now to the current vertical delineation within the pools.

MR. MACEY: Don't you recognize the fact that you have got the same vertical limits in the Blinebry Oil Pools, in the old Blinebry Oil Pools I call it, as the Blinebry Gas Pool?

A Yes.

MR. MACEY: What would you do with regard to allowing an operator to dually complete a well in those two zones?

A That is a problem.

MR. MACEY: We have already got the problem is the reason I brought it up.

A Yes. The reason we recognize these vertical limits as being all right is that you have also got the problem of many wells that have been perforated throughout the interval. Now then, if you go in and set your vertical limits at this date so that you include only 100 feet of the Blinebry, you are going to cause all the operators to go and, I think, work over 35 wells. As I said, the question is a problem. It is just which is the worst of two evils as far as I am concerned.

MR. MACEY: Let me ask you this. I think we both recognize the same problems?

A Yes.

MR. MACEY: Do you think it is advisable for this Commission to allow dual completion of the lower Blinebry zone of this

upper gas zone? Do you think it is equitable?

A No, sir, I do not.

MR. MACEY: Any other question of the witness? If not, the witness may be excused.

MR. SMITH: May I ask one question here?

By MR. SMITH:

Q For all practical purposes, the purposes of perforating interval will accomplish the same purpose as dual completions?

A That is true.

MR. SMITH: That is all.

(Witness excused)

MR. MACEY: Are there any questions of Mr. Boss?

MR. DIPPEL: No, sir, we have none.

MR. MACEY: Anyone else have any question of Mr. Boss. In that event, Mr. Boss is excused. Do you have a statement you want to make, Mr. Malone, or prefer to wait until the end?

MR. MALONE: We will hold our statement until the conclusion of the evidence, if the Commission please.

MR. MACEY: Mr. Yost.

MR. YOST. We believe our testimony will be considerably shortened. The Commission's staff is substantially in agreement with Gulf. The points that are not in agreement will be brought out in the testimony. We will try not to be repetitious.

RANDALL MONTGOMERY

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. YOST:

Q State your name, please.

A Randall Montgomery.

Q By whom are you employed, Mr. Montgomery:

A The New Mexico Oil Commission.

Q In what capacity?

A Geologist.

Q You have testified before the Commission before?

A Yes, I have.

Q Have you had occasion to make a study of the area of the Blinebry Gas Pool?

A Yes, sir.

Q Would you relate, in general, of what that study has consisted?

A I have constructed a structure contour map on the Blinebry marker in the Blinebry, covering the Townships 22-South, 21-South, Range 37-East. I have also constructed four cross sections throughout the area and have examined numerous gamma ray and electric logs and sample logs in the area.

Q In connection with your studies have you prepared Commission Exhibits 1 to 5 inclusive?

A Yes, I did.

Q And are these Exhibits accurate to the best of your knowledge and belief?

A Yes, sir, they are.

(Marked New Mexico Oil Commission's Exhibits No. 1, 2, 3, 4, 5, for identification)

Q Would you please explain Exhibit No. 1?

A Exhibit 1 is a structure contour map on top of the Blinebry marker and is on the contour interval of 20 feet. The heavy red line in the northern portion of the map is the outline of the Terry-Blinebry Oil Pool. The heavy red outline on the eastern edge of the map is the outline of the Blinebry, old Blinebry Oil Pool. The small red line indicates the line of cross sections of Exhibit 2, 3, 4 and 5, and are represented on the map. The wells that are colored red represent oil that is being produced from the Blinebry formation, which is in the Terry-Blinebry area and the old Blinebry Oil Pool. Those circles that are colored with an orange color are the wells that are completed as gas distillate wells in the Blinebry formation.

Q Do you have anything further regarding Exhibit 1?

A I would like to point out the relative flatness of this structure. The contour interval, as I pointed out earlier, is 20 feet, but the over-all relief is only some 320 feet throughout the entire area. I would also like to point out the concentration of the oil wells in this area --

Q What area is that?

A The northern part of the area of the Terry Blinebry area. And also, the relative lack of Blinebry gas wells which border this Terry-Blinebry Oil Pool in this area. I would also like to point out that some of these wells in this area have tested oil of less than 45 degrees gravity API. We also have at least two wells in this area that have formerly been classified as oil wells.

Q Will you proceed to the cross section maps which are

Exhibits 2, 3, 4 and 5, and explain them?

A These cross sections, cutting it short, these cross sections illustrate the flatness of the structure and the interval of completion that the different operators have used. I would like to point out on Exhibit 2 that the two wells in the easterly direction are Terry-Blinebry oil wells, and then as we go west and up structure these wells become, this horizon becomes a gas-bearing horizon. The same thing is portrayed in Exhibit -

Q (interrupting) Exhibit 2 is a west to east cross section?

A Yes.

Q Would you please point it out on Exhibit 1.

A That cross section runs from the western oil fields, Hill's No. 1, eastward into the Gulf Leonard 36-A. I would also like to point out on this Exhibit, Exhibit No. 2, drill stem tests and other completion data. The drill stem test almost invariably in this area indicate very little information. They are very poor. In fact, in some areas the operators have discontinued even drill stem testing because it is a waste of money. You get little or no information.

Going to Exhibit No. 3, it is also a west to east cross section, going into the Terry-Blinebry pool from the Blinebry Gas Pool proper. It begins with the Humble State B. No. 6, and goes northeastward into the Humble, to the Fullerton, the Humble Federal Terry No. 2. It portrays more or less the same thing as Exhibit 2, the correlation and where the wells have been completed. I would also like to point out that on Exhibit 2 I have a small chart here of eight wells completed in the Terry-Blinebry Oil Pool, which have had bottom hole pressure surveys, in October, 1953, and also in

April of 1954. We have extremes from 2,227 pounds to 1,107, a difference of some 1,100 pounds in the bottom hole pressure in the Terry-Blinebry Pool. The arithmetical average for these eight wells in October, 1953, was 1,724 and in April of 1954, 1,578, or a decrease of 146 pounds. Cross sections, Exhibits 4 and 5, portray the general lithology of the area in correlation and manner of completion.

Q What is Exhibit 4?

A Exhibit 4 is the west-east cross section and is shown by this red line here going from Texas Company Henderson Well eastward into Shell Starky No. 2

Exhibit No. 5 is a north-south cross section starting with the Texas Company East Lake No. 1, and going southward into the Samedan, pardon me, Sinclair Boyd No. 4.

I would also like to go back to Exhibit No. 3 with reference to the bottom hole pressures. This information indicates that permeability is relatively low. There is quite a variation in pressures in those areas.

Q Where did you get that information on Exhibit 3?

A That information was secured from the Oil and Gas Engineering Committee.

Q Mr. Montgomery, have you reached any conclusions as a result of your study?

A Yes, I have. One will note from the cross sections and structure map that the Blinebry oil is produced on the flanks of the structure and while that dip, the same stratigraphic unit becomes productive of gas. Therefore, this is probably an oil rim of a gas pool. The gas-oil contact appears to vary from one stratigraphic

unit to another, but for the main, the Blinebry oil section has a gas-oil contact in the range of minus 2,260. The water-oil contact is found at minus 2,348 in the Continental Lockhart-B 26, in Section 12, 21-S, 36-E, which is in the boundaries of the Terry-Blinebry pool. In Western Oil Fields No. 1 Hill, has minus 2,464. It is a dry gas reservoir with an oil rim. When oil is found in such a reservoir, if pressure on the gas lowered faster than in the oil, the oil will migrate up structure and essentially all of the oil will be lost. In this particular reservoir, due to the low permeability, which is demonstrated by the bottom hole pressures in the Terry-Blinebry pool, and also by the drill stem test and, in its present stage of development, pressure in the oil pool is being lowered faster than that in the gas pool, indicating that oil probably is not migrating up structure. Since the Terry-Blinebry Oil Pool may become considerably larger and gas completions become more numerous near the gas-oil contact, I recommend that a semi-annual bottom hole pressure survey be made of all the Blinebry gas wells within one mile of the Terry-Blinebry Oil Pool, and that all Terry-Blinebry oil wells be included in that survey. If and when the pressure on the gas wells becomes lower than that of the oil wells, I further recommend that the Commission follow one or a combination of the following methods of preventing waste:

(1) Limit gas production to the same reservoir space as oil.

(2) Produce gas wells under present rules and raise the gas-oil ratio limitation to such a figure as to allow the oil wells to void one quarter reservoir space that would be voided by a gas well on 160 acres,

(3) Remove the oil allowable from the oil wells and allow

the oil wells to void one quarter of the amount of reservoir space that will be allowed a gas well on 160 acre unit.

Also, I further recommend that a gas well be defined, in order that wells completed near or in the gas-oil contact can be classified, in order to prevent drainage and waste. This problem will become more pressing as development continues in the direction of the gas-oil contact. One example is a well that is not in the Terry-Blinebry pool, but actually was completed as an oil well in the same stratigraphic unit. Its initial potential flow was 110 barrels of oil a day, gravity of 41 degrees, no water on 20/46 choke. The gas volume was 643 MCF, the GOR 5,645. This well is presently classified as a gas well, but was classified as an oil well from August, 1953, until December, 1953, at that time it was reclassified as a gas well. It is produced on the average of some 57 barrels of oil per day and half a million cubic feet of gas, that is an approximate figure, the gas. The closer figure would be 475 MCF per day. This is to be compared with the Terry-Blinebry oil well which is producing from the same horizon. In the Terry-Blinebry Oil Pool the allowable is 52 barrels a day, with gas-oil ratio of 2,000:1. For the month of October this particular well, the operator requested 70 barrels a day allowable which we are presently carrying in the schedule as a condensate, it is distillate produced with the gas. I am not just exactly sure on Gulf's recommendation of 100,000:2. I do think, I haven't had an opportunity to know what the extenuating circumstances would be from that, but I do believe that a combination of gravity of the oil and gas-oil ratio would be one way of handling this particular problem. I would also further recommend that Gulf's recommendation

as far as administrative purposes be concerned, that we do not have the Blinebry and the Terry-Blinebry Oil Pools overlapping one another.

MR. YOST: I believe that is all.

MR. MACEY: Any questions of the witness?

MR. STANLEY: I have no question, but I wish to clarify the record if and when, or should, the Commission require bottom hole pressure data in the Blinebry Gas Pool. There are 64 gas wells in the Blinebry Gas Pool, and of that number, 53 are dually completed, and dually completed in such a manner that the Blinebry gas zone and the Drinkard Oil zone, or whatever the case may be, is separated by production type packer or retained in the absence of a side door choke to permit the blanking off of the bottom zone and taking the bottom hole pressure of the upper zone. Therefore, this would entail that the operator unseat the packer, run a production type packer with a cross-over tool, or perhaps a side door choke to facilitate the taking of bottom hole pressures.

MR. MACEY: Mr. Stanley, are you sure that all those wells can't have pressures taken on them?

MR. STANLEY: I didn't say all of them. I said many are completed in that manner.

MR. MACEY: If I am not mistaken, I think all the dual Commission orders that the Commission has approved require that they can take separate tests. If they can't take separate tests, maybe they ought to cancel the permit.

MR. STANLEY: That may be so, but I believe it would require investigation prior to the order being written.

MR. MACEY: Any question of the witness? Mr. Malone.

CROSS EXAMINATION

By MR. MALONE:

Q I would like to ask the witness one question. Mr. Montgomery, in your opinion would it be feasible to take shut-in pressures and convert them to bottom hole pressures for the purpose of the problem that you refer to.

A In gas wells?

Q Yes.

A In many cases, Mr. Malone, the surface pressures do not reflect the bottom hole pressure. The gradients vary. Oftentimes the wells are logged up. I am not sure whether that is the situation in this area or not. I feel sure this is the situation that will happen as development continues toward that contact.

Q It would be your view then that it would not be possible to effectively make that conversion taking into consideration the gravity of the distillate, and so forth, to arrive at any basis to be used in lieu of bottom hole pressure?

A I do not qualify as an engineer, but it is my opinion, Mr. Malone, that would not be satisfactory.

MR. MALONE: Thank you.

MR. MACEY: Any other question of the witness? If not, the witness may be excused.

(Witness excused.)

S. J. S T A N L E Y

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. YOST:

Q State your name, please.

A S. J. Stanley.

Q What is your occupation Mr. Stanley?

A I am an engineer for the Oil Commission.

Q You have testified before the Commission before, Mr. Stanley?

A Yes, I have.

Q Have you had occasion to make a study of the Blinebry Gas Pool area?

A Yes, I have.

Q Would you relate, in general, what that study consists of?

A I have studied bottom hole pressure data, well completion practices, throughout the Blinebry gas zone, the Terry-Blinebry oil pool, the Blinebry oil pool; gas-oil ratio data and other engineering data related to the pool.

Q In connection with your study have you prepared what has been marked Commission Exhibits 6 to 25 inclusive, with the exception of Exhibit No. 8?

(Marked New Mexico Oil Commission's Exhibits No. 6 to 25, for identification.)

A Yes, I have.

Q Is the information reflected thereon accurate and true to the best of your knowledge and belief?

A Yes, it is.

Q Before you comment on your Exhibits, do you have a statement that you care to make?

A Yes, I intend to shorten my testimony considerably in view of the fact that we fundamentally agree with the Gulf Oil Corporation. I would like to bring out those points in which we do not agree.

Q Directing your attention to Exhibits 6 and 7, would you please explain those exhibits?

A Yes. Exhibit No. 6 and 7 are actually a duplication of Mr. Boss's testimony in the presentation of his particular exhibits. I would like to point out a very important factor in what is marked as Exhibit No. 6, and relate a little further the condition that exists in the Blinebry pool. On this particular exhibit, marked number 6, you will note that we have many circles throughout the Blinebry gas pool, outlined in black coloration, and these circles indicate the wells that are located in the Drinkard oil pool which directly underlies the Blinebry gas pool. However, there is one more gas pool between the Blinebry gas pool and the Drinkard pool and that is the Top pool. There is another reservoir which underlies the Blinebry gas pool, that is the Juan Tabo. Therefore, the development of the Blinebry gas pool does not exactly necessitate the drilling of new wells, but the fact that many of these oil wells are as they are, depleted, can be plugged back or, if they are today of commercial value, they can be dually completed. Consequently of the 64 gas wells that we have at the present time, approximately 53 dual completions and eight plugged back, and the remainder of the original wells drilled to the Blinebry gas zone. It tends for a very profitable operation and it is important in my recommendation that I am going to make at the present time, in

which I differ from the Gulf Oil Corporation, on the matter of the establishment of gas proration units. I believe that in the Blinebry gas pool the standard proration unit should be 160 acres or a fraction thereof, and not to exceed 160 acres in multiples of greater than 160 acres.

Q I will hand you what has been marked Commission's Exhibit 8 and ask you what that is?

A Exhibit No. 8 is a pamphlet written by Mr. M. R. Dean and Mr. F. H. Poettmann, of the Phillips Petroleum Corporation Research Division in Bartlesville, Oklahoma, and the report is numbered 102-51-54R, and I might add that I have received permission from the Phillips Oil Corporation to use this particular pamphlet in my testimony.

A Would you please refer to the protion of the pamphlet that you want to bring to the Commission's attention?

A This pamphlet consisted of certain theoretical studies pertaining to retrograde condensation. However, I am not a theorist, and it does contain considerable practical information which in evidence agrees with Muskat with the Gulf Oil Corporation, and that is the reason that I am using this pamphlet is the fact that it does contain some very basic facts pertaining to condensate reservoir.

Q Would you please read the portions you wish to bring to the Commission?

A Figure 1 is entitled "The Characteristics of a Gas-Condensate Reservoir". First, that it have a GOR greater than 10,000; second, that the tank oil gravity is above 48 degrees API; third, that the tank oil color be straw to colorless; four, that the

composition is rich in methane; fifth, that the molecular weight of the heptanes plus fraction be between 120 and 170; and six that the phase state of the reservoir fluid is at the retrograde dew-point pressure or above.

Q Mr. Stanley, do you agree that these are substantially the characteristics of the reservoir described?

A Yes, I believe that generally that is accepted by the industry. I would like to state further that in this particular pamphlet and subsequent pamphlets written by the Condensate Research, there is an important fact that distinguishes a condensate reservoir, which we can refer to as a light oil reservoir, and the one that produces heavy oil is a dark oil and that is referred to as just an oil reservoir. In the first place, they produce with two different types of mechanism. That is, produced by thermal dynamic principles, that is the condensate reservoir is produced by the reduction of temperature in pressure and the oil reservoir itself is produced by dynamic principles, whereby the actual fluids or liquids occur into a reservoir, move into the well bore. The reason that I brought up this point, it is not clear to us that the entire Blinebry pool is a condensate reservoir. In some wells it may act as a condensate reservoir and in others it may not. Usually whenever you speak of a condensate reservoir you speak of one that is actually a gas reservoir. Whenever you run bottom hole pressures into that particular reservoir you will note that you have a gas column from the surface to the bottom. However, that may not be true in all condensate reservoirs, but certainly in all the pressures, for generally, let me say, in the majority of the pressures that we have taken in the Blinebry

gas pool, we have encountered gradients which are of a character of an oil gradient. In this connection, I would like to present a sample from what I consider, and I believe the industry considers, a true condensate reservoir, and that is the Skelly Oil Company Dow B, No. 21, located in the Wildcat pool in the Majamar area in Eddy County, and producing from Pennsylvania production. The reason I would like to present the sample is that it does describe that in the Phillips pamphlet a sample from condensate reservoir should have a tank oil gravity of 48 API and the liquid should be either colorless or straw color. I would rather describe this sample than to present it as evidence. It is pretty dangerous and for the -

Q (Interrupting) Just describe it for the record.

Q The liquid encountered is colorless and has a heavy, or has a high gravity in the neighborhood of 70 degrees API. The reason that I say it is dangerous, when we were transporting this sample from Majamar it blew up in the car and we had to return to get another one.

Q Directing your attention to Exhibits 9, 10 and 11, will you please explain those Exhibits?

A Exhibits 9, 10 and 11 relate to certain wells which describe the completion program of these wells and which are actually distributed throughout the Blinebry pool. The first well that I would like to go ahead and describe, which does not appear on this particular exhibit, but does appear on Mr. Montgomery's exhibit, is the Western Oil Fields, Incorporated, Gulf Hill No. 1, located in Section 4, Township 21-South, Range 37-East.

The reason that I would like to describe this particular well is because I made a point to observe the entire completion program of this well from the time that it reached total depth, a drill stem test prior to reaching total depth, and I am familiar with the completion of that particular well. This well was completed on June 3, 1954. The elevation was 3481; total depth, 5974 with 5½ inch oil string set at 5970.

In drilling this well, the operator drill stem tested in what was referred to by Mr. Bess and Mr. Montgomery as the main Blinebry gas zone, from 5652 to 5818, and recovered 280,000 cubic feet of gas per day, with some undetermined amounts of distillate. The operator then proceeded to drill to total depth and set his pipe as close to the bottom as possible, and then selectively perforated the oil string.

The operator had chosen to perforate the oil string in two different zones. The first zone from 5652 to 5818, and from 5864 to 5884, and included in that zone from 5926 to 5956. Those two perforation intervals I will indicate as Zone No. 2.

The operator proceeded to set a Baker packer retainer between these two zones at 5850. He acidized the upper zone which is marked Zone No. 1, with 3,000 gallons and the well produced, prior to cleaning up, 1,300,000 cubic feet per day at 680 pounds back pressure, and an undetermined amount of condensate. He proceeded with Zone No. 2, swabbed it dry. The casing pressure above the packer on the uppermost zone was 1650 pounds. Since there might have been a bit of fluid above that packer in the upper zone, I would estimate that perhaps the pressure could have exceeded

1850 pounds and that there existed a differential of that total amount of pressure across the packer.

The operator then proceeded to acidize with 5,000 gallons of acid and produced 1.3 barrels per hour of oil, with an estimated 300 feet of fluid level in the hole while swabbing, and at no time did the casing pressure vary in Zone No. 1 from 1650 pounds observed. Therefore, in that particular well there was complete vertical separation between the main Blinebry gas zone and the underlying oil zone.

I would like, at this particular time, to show the position of the Western Oil Fields well which is located in Section 4, Township 21-South, Range 37-East, at the same time, subsequent gravity tests were conducted during the operation of the well and there existed some 15 degrees gravity difference between the so-called condensate above and the oil below. In proceeding to an exhibit here marked Exhibit No. 12, this well appearing on this particular exhibit, I would like to go ahead and describe a Stanolind Oil and Gas Company well, marked the T. E. Owen B-4, located in Section 34, Township 21-South, Range 37-East. This particular well structurally is located near the center of the pool and I would like to show its structural position with respect to Mr. Montgomery's contour map.

You will note that it is approximately in the center of the pool, that it is only a mile straight north or slightly north, northwest from the highest point of the pool, and, for all practical purposes, we may state that this well is actually drilled structurally favorable in the Blinebry Gas Pool, and is very high

on top of the structure. This particular well encountered the top of the Blinebry marker at approximately 5538. I don't know whether this exhibit is visible from the back of the room, but Stanolind Oil and Gas Company did perforate this particular well in various stages from the top of the Blinebry, very close to the top of the Tubb. I could, for the sake of the record, read the perforating intervals, but I don't think that is necessary, since I will introduce the exhibit in order to save time.

However, the operator has chosen to set packer at 5766, at approximately this position, to determine the gas-oil contact. He acidized below with 3,000 gallons and 7,000 gallons above the packer. He tested above the packer for nine hours, recovered 27 barrels of oil and 43 degrees gravity API, and 2,033,000 cubic feet of gas per day.

They reset the packer at 5661, moving up the hole to try to determine the gas-oil contact and tested below the packer. Stanolind recovered 52 barrels of oil per day, 39 degree API and 1,360 MCF per day. They turned right around and tested above the packer at 5661 for 12 hours, recovered 7½ barrels of oil per day, 47 degree oil in 12 hours, with 1,723 MCF per day. They tested five more hours as the well cleaned up, recovered one barrel of oil at 47 degree API gravity and 1,570 MCF per day.

The reason that I related this well to the Commission, I would like to know that we have in some instances considerable oil production between the main Blinebry gas pay, that in the Western Oil Wells there is insignificant vertical communication and that there is a difference in gravity of the various oils encountered as you proceed down hole.

There is one more particular well that I would like to refer to and this is, I think, our problem child, the Rowen Oil Company Blinebry, the Federal B Elliott, B-13, No. 1-E. We decided after last month's hearing to test this well, that one of the Commission's representatives test the particular well in order to determine if there was vertical communication between the main gas zone and the lower oil zone. What we had done in this particular well is had the tubing and the casing shut in at approximately the same time, and, after 24 hours build up, we ran a bottom hole pressure inside the tubing at the sub-sea datum of minus 2400 approximately, which is the datum for the pool, and we found that the pressure in the tubing was 899 pounds. We found that by using a continuous time recording instrument, we found that the casing was 1,720 pounds. We proceeded to open up the well below the packer by opening up the tubing valve to test this well. I do not have the amount of oil that it made, but if I remember correctly it made approximately 25 barrels of oil per day, but its production through the tubing had no reflection, or no pressure drop on the continuous pressure time recorder on the casing, indicating again that there was no vertical communication between the upper Blinebry gas zone and the so-called Blinebry oil zone or the Terry-Blinebry oil zone whatever may occur.

I would like at this particular time to show the Commission various samples that I had obtained in the Blinebry gas pool, to show the difference in their physical characteristics and the difference in the particular fluid gravities, to show that the field is very complex, that in some places we may have a con-

densate reservoir, that in other places we may have an oil reservoir.

Q First, did you obtain these samples yourself?

A Yes, I did. I obtained every sample. I would at this particular time, since we were talking about the Rowen Oil Company, I would like to present the samples that were obtained above the packer and below the packer. For all practical purposes the coloration is the same, I think that you may define the sample that was obtained from the tubing below the packer as slightly different in color, if you observe them very closely. However, they do look alike. The main difference between this particular sample that was obtained above the packer in the Blinebry gas zone is the fact that it has a gravity of 52 degrees, but below the packer the particular gravity was 41 degrees. I might add that neither sample exactly conforms to the description as presented in this particular pamphlet written by the Phillips Oil Corporation, nor to samples described by Muscat in his study of condensate reservoirs.

In this particular sample which is also obtained from the Blinebry Gas Pool, that particular well is Sinclair Oil and Gas Company Sarkis No. 1. It has a gravity of 76 degrees API, is straw colored, and probably would fit the description of condensate fluid. I might add that that particular well and a study of its completion and gas-oil ratio, that the well itself flows on a very steady gas-oil ratio from one month to the other. That will be shown on subsequent testimony.

The reason that I have brought out these particular samples after an extensive search, is the fact that I would like to show the difference in the gravity of crude obtained from

three wells on the cross section that is relatively flat. One is the Stanolind Eva Owens which we described, and proceeding eastward to the Gulf Corporation Mark Owen No. 6, then the Ohio Oil Company Mark Owen No. 2.

These three wells are about the same on structure and yet they have entirely different characteristics whenever you test a sample. For instance, in the Stanolind Oil and Gas Company well, we had caught one sample from the Blinebry gas zone, which is the sample and which I lost part of it, here the second sample is a recombined sample of the Stanolind Oil and Gas Company, and recombined with their Eva Owen B-2, which is a Tubb gas well and actually produces a colorless fluid, but whenever you combine the Blinebry gas sample with the colorless fluid obtained from the Tubb gas you do obtain a slight difference in coloration which is handled by Mr. Macey at this particular time. However, it has a higher gravity than this particular well, being recombined and having a gravity of 64 degrees API.

As we go eastward, the Gulf Oil Corperation Mark Owen No. 6, has even a higher gravity than the Stanolind well, having 52.2 degrees, and still further eastward the Ohio Oil Company Mark Owen No. 2, having a gravity of 69.2 degrees. In that same area we have something in between the Ohio and Stanolind well that is Humble Oil and Refining New Mexico State S No. 14, in Section 2, 22, 37, having a gravity of 67 degrees. The Gulf Oil Corperation Vivian No. 5, in 30, 22, 37, having a gravity of 68 degrees. We have various other samples throughout the oil pool of almost any type of coloration or gravity that one desires.

Therefore, I do believe that in this particular study the gravity sometimes is not an indication of the wells' characteristics, but the completion program is. In fact, careful observation on one well, the Walter Famariss Well in Section 21, after the well had been shut in for some considerable period of time, we caught samples when it was first opened up and obtained gravity samples of 70 degrees API. The liquid was straw colored and two hours later the gravity had decreased to 44 API with a bi-coloration. It also has been observed throughout the pool that actually the gravity does vary considerably and the oil color does vary considerably, depending upon the manner in which the well is flowing.

Q Would you please explain Exhibits 13 and 14?

MR. MACEY: Would this be a good time for a break?

(Recess)

MR. MACEY: Proceed, Mr. Yost.

A I would like to make a statement here to clarify my position. It has come to my attention that some people have misunderstood a statement that I made previously in my testimony, to the effect that the Terry-Blinebry oil pool and the Blinebry gas pool are different reservoirs. On the contrary, I believe that they are one and the same reservoir.

Q Mr. Stanley, will you please explain Exhibits 13 to 21 inclusive?

A Although Exhibit 13 is not marked it is a gas condensate ration map of the Blinebry gas pool. Ordinarily, in the Phillips' pamphlet and Muskat's pamphlet, and all the literature I have read on condensate reservoirs, the usual observation is that the gas

condensate reservoir is fairly uniform throughout the pool, and it behaves in time with certain characteristics which are related from one to another within the pool.

However, this map was drawn and taken from C-1158 on the various wells in the Blinebry gas pool to production activity the amount of gas they produced in August, 1954, and the amount of distillate they produced during the same interval, and there is no rhyme or reason for this particular map as far as correlating gas condensate ratios. We may run from one very low value of 2,225 to one in a gas pool, to perhaps a maximum value of 180,000 to one. Rather than try to decipher this map, I have drawn a comparable exhibit in colors, where the yellow colors are less than 25,000 to one, and red colors are 25 to 50,000 to one, the purple 50,000 to 75,000 to one, the green 75,000 to 100,000 to one, and the blue in excess of 100,000 to one.

Q What exhibit are you referring to now?

A I am referring to Exhibit No. 14. We will note that even in the central part of the pool, if you will compare this particular point of the southwest quarter of the southeast quarter of Section 34, Township 22-South, Range 37-East, that we have a very low value of a gas-oil ratio, being less than 25,000 to one, and yet this is flanked to the west by gas-oil ratio between 75 and 100,000 to one. That is 75,000 to 100,000 to one, and to the east we have a value that is in excess of 100,000 to one. These conditions of varying gas-oil ratios are an indication of structure, and vary throughout the field, and also vary from one particular month to another.

With reference to this exhibit, I believe that the manner in which the wells were completed in the Blinebry gas pool and the underlying various oil lenses greatly affects the gas-oil ratio.

To continue with the study of gas-oil ratios, and I would--or gas condensate rations, I would like to include Exhibits No. 13 to No. 21, which is actually a gas condensate ration study of the various wells that have been chosen. Actually in the true condensate reservoir, the gas condensate ratio should not vary from one month to another and should follow some characteristic, as this particular ratio in Exhibit No. 16, on the Olsen-Boyd No. 2, from the period September, 1953, through June of 1954.

I do have another exhibit here, Exhibit No. 20, the Sinclair Oil and Gas Company Sarkis No. 1, which does not vary in the type of distillate that is produced, having a very high straw colored distillate, and from September of 1953 to August of 1954, the gas condensate ratio remained fairly constant, even though the gas production and, of course, its related condensate, varied with it, too. However, this is not true of all the particular exhibits and we have a wide variation of gas condensate ratios. Part of that variation also depends on the manner in which the gas well is flowed.

Also on these particular exhibits we can't tell the number of hours that the well flowed during that month or the number of days that if flowed and the number of hours that it flowed each day, in order to bring about a detailed analysis and correlate, sometimes, the explanation for a high gas condensate ratio or one of a low value. However, I do think that in mentioning the varia-

tions in the gas condensate ratio, will explain my case that we do not in all cases have a true gas condensate ratio.

MR MACEY: What was the last word you used?

A I mean true gas condensate reservoir.

Q I direct your attention to Exhibit 22.

A Exhibit 22 shows in colors the various shut-in pressures in the Blinebry gas pool, various bottom hole pressures.

Q Are you referring now to Exhibit 1?

A I am referring to Exhibit No. 6 actually.

Q Six?

A We have referred to this particular exhibit before in the opening part of the testimony.

Q I want to get the record right.

A I am referring now to Exhibit No. 6. In this particular exhibit, we have also attempted to draw a contour map of bottom hole pressures and shut-in pressures. Usually you can't correlate shut-in pressures of true gas holes, whereby you do not have any fluid, but under the circumstances where you have taken shut-in pressures at the surface of the Blinebry gas pool, you will note that there is a wide variation of shut-in pressures at the surface due to the fluid built up in the tubing. Also, we have attempted in this particular survey to take some bottom hole pressures of the Blinebry gas pool as compared to surface pressures. We have also conducted and taken pressures in the Terry-Blinebry oil pool.

I would briefly like to use Exhibit No. 6 and show the different bottom hole pressures versus the surface pressures. For instance, on the Olsen Oil Company, Dangrade No. 1, in Section 13,

Township 22-South, Range 37-East, the surface pressure is 1,756 pounds, and the bottom hole pressure is 2,269 pounds, or a variation of approximately 490 pounds.

This condition is noted throughout the field and there is a pressure differential at the surface of 1,722 pounds with an oil column creating a bottom hole pressure of 2,135 pounds. We havevarious parts of the pressures, depending on whether they are taken at the surface or whether they are taken down hole. The pressures noted in red on this particular exhibit actually reflect the bottom hole pressures, and the holes recorded in green are actually surface pressures. Now, those pressures on this particular exhibit that are recorded in red are pressures within the defined limits of the Terry-Blinebry oil pool.

Now, I might note that there is a greater variation in pressures from one well to another. For instance, on one particular well in the Terry-Blinebry oil pool we have a pressure of 986 pounds and its north off-set has a pressure of 2,113 pounds.

In order to shorten my testimony, I might add that Gulf brought out this particular point that the reserveir has the characteristics of having very low permeability values, low porosity values, and actually it takes a well longer than 72 hours for it to build up to the maximum pressure. I believe that if all these wells were shut in for long periods of time in the Terry-Blinebry pool, from the correlation that we have made across this pool showing that it is the same reserveir, that these bottom hole pressures in the Terry-Blinebry oil pool would equal all these in this area in the Blinebry gas pool. However, that may not be true

in the Blinebry oil pool and I do not believe that it is true in some of the underlying oil pools, underlying the Blinebry gas pool. I do believe that there is a differential that exists, especially whenever you consider cases as we did in Exhibits No. 11 and 12, and some of the cases as exhibited in Stanolind Oil and Gas, Eva Owen B-4, and others throughout the particular field.

In studying bottom hole pressure build-ups, I might mention this particular exhibit, Exhibit 22, which is part of the bottom hole pressure that we have taken, and Shell Oil Company had contributed some information on one of their wells in the Terry-Blinebry oil pool, on this particular exhibit the order naturally reflects the bottom hole pressure from zero to 1900 pounds of 2000 pounds, and, of course, the horizontal scale is the time and hours that the well is shut in. We notice that after 66 hour shut-in, obtaining the pressure of 1972, that the well was continuously building up. I believe that if it were allowed to be shut in for a longer period of time, it would eventually reach the field pool pressure.

I might read into the record that after 24 hours the well had a pressure of 1658 pounds; after 48 hours, 1808 pounds; after 66 hours, 1872 pounds and still climbing. In studying bottom hole pressure curves we note that whenever a well takes such a long period of time to build up and never has reached the maximum build-up pressure, we can state we have a condition of low permeability.

Q Moving on to Exhibit 23, would you please explain what that portrays.

A Exhibit No. 23 actually explains the various values that were compiled by Muskat in the Research Department of the Gulf Oil Corporation, and, in some instances, by the Phillips Oil Corporation, that it is typical of a gas condensate reservoir that whenever you lower the pressure -- and in this particular exhibit the pressures on the horizontal scale, from zero to 4400, and on the vertical scale, it does give you the gas condensate ratio and 10,000 cubic feet per barrell -- that actually whenever you decrease the pressure in any gas condensate reservoir you ordinarily get an increase in the gas condensate ratio. Until, as in all the cases, that you reach a final state of completion in a gas pool, then you do get a drop in your gas condensate ratio.

However, this is not true with the Blinebry gas pool. Since 1947 from the date of discovery, as depicted in Exhibit No. 24, the gas condensate ratio has actually declined. Perhaps the reason it has declined, and further declined in 1952 to 1953, is that whenever you observe the completion practices of many gas wells in the Blinebry gas pool there is some attempt, and in many cases a very important attempt, to recover as much dark, or recover a greater volume of dark oil as is possible by selectively acidizing and perforating. Perhaps at a future time this curve will probably approximate this curve with time, but it has not done so since 1947.

I might also add that the red value is the dry gas production from 1947 and the blue value is the condensate production that is reported by the Commission, that is reported to the Commission. However, in this particular curve, sometimes in the

way the rules have been written for the field, and I realize it is almost impossible to differentiate in this particular pool the dark oil from the light oil, I believe all the condensate that is reported here may be sometimes in the form of a dark oil. However, I do believe it is unimportant.

In the conclusion of these two particular exhibits, I would like to go ahead and present my last and final exhibit, marked Exhibit No. 25. This exhibit is more or less an economic exhibit, and shows a 1953 production data based on 9½ cent Blinebry condensate was 117,311 barrels and based on $2.75 a barrel, which may be a little low but still is a relative figure, we have a value of $322,605, a little over $322,000.00 In the Terry-Blinebry the value was $391,921.00. The Blinebry oil $117,299.00. Actually expressed in percentage and combining the two oil reservoirs -- however, this does not mean that they are connected to the Blinebry gas pool in the case of the Terry-Blinebry oil -- actually the gas comprised 41.6 per cent of the total revenue of the field; the Blinebry condensate 22.6 per cent; and the oil is 35.8 per cent.

I have attempted to take the August, 1954, figures to approximate if there was a relative ratio between August, 1954, production data and its net worth to the 1953 yearly production data. The percentages are similar. For instance, in 1953 we had a value of 41.6 per cent for the Blinebry gas. In August of 1954, using the same units, we had a value of 41.4 per cent, or a difference of only 0.2 per cent. Perhaps where the greatest difference is, is the decline in oils which could be affected by Blinebry oil pool itself and its rapid completion, or perhaps that

we have a reclassification which we do have, whereby an operator chooses to call it condensate rather than a dark oil. Nevertheless, the variation there is the Blinebry condensate of 22.6 per cent in 1953, is not much different from the August 1954 value of 25.1 per cent. Neither do we have a great variation in the value of the oils. During the entire year of 1953, as we said, 35.8 per cent, during the month of August, 33.4 per cent. That little difference could mean a difference in classification.

Q Your production information was secured from Commission records?

A Yes, they were secured from the Commission records.

Q Mr. Stanley, would you please summarize and give the Commission any recommendations that you might care to make?

A First of all, I believe that the Blinebry gas pool is a very complex reservoir, that it may be a gas reservoir. It certainly has a connected oil rim; and the Terry-Blinebry oil pool, I believe that it has an underlying oil pool in various lenses. I do believe that the underlying oil pool cannot be recovered by drilling another well. By that I mean that I do not believe that it is economical to drill a separate well to the underlying oil pool, but I do believe that the dark oils that are produced in the Blinebry gas pool are very important, and I believe that these oils will never be recovered on very wide spacing. The only recommendation that I have to make at this particular time on the Blinebry gas pool is that the wells be drilled, completed, and prorated on a 160-acre spacing to recover the greater maximum amount of dark oils possible.

MR. YOST: At this time we would like to offer in evidence Commission Exhibits 1 to 25 inclusive.

MR. MACEY: Any objection to the introduction of these exhibits in evidence? If not, they will be received in evidence.

MR. YOST: That is all.

MR. MACEY: Any question of the witness? Mr. Smith.

CROSS EXAMINATION

By MR. SMITH:

Q As I recall the summation of your testimony, you testified that in your opinion there is an underlying surface of oil underneath the Blinebry gas cap?

A Yes.

Q As I recall the rules, they provide at present for 75 feet above the Blinebry marker and 300 feet below. In some instances, this oil that you talk about being below the Blinebry will lie below that definition, is that correct?

A That is correct. We have, in some instances, tried to determine, especially to the west side of the pool, the water-oil contact, but I do not think that that has been fairly established. Our figure is minus 2465. However, we do feel, and I do feel rather, that there is that underlying oil that you have mentioned within these limits.

Q As I interpret your testimony further, it is uneconomical to drill wells to get to the oil, it would naturally follow there, for it would appear to me, and I would like your opinion on the matter, that a perforation at a point below 300 feet below the Blinebry marker would be called for in some instances?

A That is correct. I think if you will study further, at one time, and I believe it was in May of 1954, of this particular year, the Commission had defined the vertical limits of the Blinebry gas pool as being just merely the Blinebry formation, and several operators have chosen to perforate below those limits. I definitely belive that the operator should not go through the expense of plugging back. I think that it would assure greater oil recovery from those depths and also that a new well drilled to that depth horizon will definitely not pay out.

Q In your opinion then, the requirement to plug back to a point 300 feet below the Blinebry marker would probably result in the loss of condensate or oil as the case may be, which would probably never be recovered?

A I believe that if the wells were completed in good faith prior to that order R-464, which defines the limit, I do not feel it is economically feasible to be forced to plug back.

MR. SMITH: Thank you.

MR. MACEY: Anyone else? If not, the witness may be excused.

(Witness excused.)

MR. MACEY: Do you have anything further, Mr. Yost?

MR. YOST: We have nothing further.

MR. MACEY: Mr. Dippel, do you have a witness, or do you wish to withdraw your direct testimony?

MR. DIPPEL: We will not have any witness. We would like to make a statement at the close.

MR. MACEY: Is there anyone else who has any direct

testimony in the Blinebry gas case? Anyone wish to make a statement in connection with the case? Mr. Smith.

MR. SMITH: May it please the Commission, our chief concern in this case is the fact that we have some five out of six wells that have been perforated at a point below 300 feet from the Blinebry marker. We would like to ask the Commission to give consideration to Mr. Stanley's testimony and write the rules in such a manner as to permit the continued operation of these wells without the requirement of additional work-overs or squeezed back, or eliminating the possibility of recovering the additional dark oil that Mr. Stanley testified about from the point below that. I would like to suggest that the Commission could restrict the exception contained in the order to make sure that the well does not encounter any of the production from the Tubbs. As long as we stay above the Tubbs, I think that the best interest of conservation for the ultimate recovery will be best served.

MR. MACEY: Anyone else?

MR. MALONE: Ross Malone, for Gulf Oil Corporation. Gulf has presented to the Commission the results of its studies in the Blinebry area, and summarized rules based on the previous field rules of the Commission. We noted with interest and with a considerable amount of, I won't say relief, but satisfaction, that in general the Commission's staffs agreed with the conclusions that we had reached, and the only significant difference insofar as the recommendations were concerned was with reference to the size of the proration unit. We, therefore, recommend to the Commission the adoption of rules generally conforming to those sub-

mitted by Gulf.

MR. HINKLE: Clarence Hinkle, representing Humble Oil and Refining Company. The Humble would like to go on record as recommending to the Commission the adoption of substantially the same field rules as heretofore adopted in the Jalmat and the Eumont pools for the Blinebry, Tubb, Byers-Queen, Justis, gas pools, including the 640 acre proration unit and the limiting factor in connection with the gas-oil ratio.

MR. MACEY: Mr. Dippel.

MR. DIPPEL: We feel that the testimony certainly indicates that the Blinebry pool presents a very complex problem, both as to development and as to regulation. It is our opinion that there is a real possibility that commercial oil production will be found below the barrier underlying the upper zone of permeability. We feel that both Gulf and the Commission's staff are to be commended for the work that they have done and the evidence they have presented.

Frankly, we had hoped to be prepared to present some evidence, but we had not gotten as much information together as we felt we should have before we undertook to present evidence, and that is the reason we elected not to do so. We feel, however, that all of the essential data has not been obtained, and it is, therefore, our recommendation that rules be adopted on the basis of the testimony and evidence that has been offered here today, but that they be on a temporary basis only, and for a period not to exceed six months. We should like to recommend that those rules, if they are to be for a period longer than for six months, would contain a provision requiring the taking of bottom hole pressures

at intervals not to exceed six months, and that a definite time be fixed. If it is six months or a different period, we would like to recommend that the rules be limited to a certain temporary period of time, and that we come back at that time and undertake to present the results of further studies. We will assure the Commission that Continental Oil Company will continue studies and, if they are temporary, that we will have some evidence to present at that time. Thank you.

MR. MACEY: Thank you, Mr. Dippel. Anyone else have a statement in this case?

MR. COUCH: Terrell Couch, for the Ohio Oil Company. The Ohio feels that the rules that were adopted for the Eumont-Jalmat Pools and the Arron Pool, in order 520, although we don't purport to advocate each and every provision of them, we feel that the rules are generally workable, and that they would be applicable and workable on this gas pool involved in this case.

We do think that certain changes have been indicated and are indicated and will be indicated in the future, as we operate under rules similar to that. In that connection, one change we would recommend would be the provision that the no-flare section of those rules not apply to a newly completed or a newly dually completed well until an opportunity has been granted there to arrange for a connection and making a saving.

One other thing we might add in connection with Gulf's proposal, the procedure outlined there for obtaining non-standard units and their rules they have presented, we think those procedures and requirements are more workable than those in the rules adopted

in Order 520. We would go along with that. However, we do think that the size of the non-standard proration unit, along with Humble, we think that should be 640 acres.

MR. MACEY: Mr. Smith.

MR. SMITH: I would like to supplement the statement I formerly made by saying that we would suggest the adoption of the proposed rules by Gulf by the Commission with, of course, the suggested change or exception that I made first.

MR. DIPPEL: I forgot to state that Continental would recommend that proration units be restricted to 160 acres.

MR. MACEY: Mr. Montgomery.

MR. MONTGOMERY: I would like to ask Mr. Smith - he said down to the top of the Tubb. Were you referring to the Tubb markers defined by the Commission or to the Tubb Gas Pool as defined by the Commission?

MR. SMITH: I think probably the best answer to that is the first statement that I made, that is to avoid the obtaining of production from what is known to be Tubb pay. I don't know precisely what the marker is chosen by the Commission. I assume it is the point 300 feet below the top of the Blinebry. Is that what you have in mind?

MR. MONTGOMERY: I was referring to defining the Tubb marker and the vertical limits of the Tubb pool was 100 feet above that marker. I wanted to know if you wanted to perforate the Blinebry gas into the Tubb gas field?

MR. SMITH: No, we do not. It will be above the Tubb gas marker.

MR. MACEY: Anyone else?

MR. SMITH: I would like to make another statement. I would like to restrict my recommendations on the rules just to Case 727, the Blinebry pool. That is the one, the adoption of the rules proposed by Gulf.

MR. MACEY: Anyone else. Does anyone have anything else in the consolidated cases 727 and 728.

MR. BUSHNELL: H. D. Bushnell, Shell Oil Company. We would like to go on record as concurring with the recommendations of Gulf except that we do recommend 160 acre gas proration unit in the Blinebry gas pool as recommended by the Commission.

MR. MALONE: May it please the Commission, may I make clear for Gulf the fact that our recommendations with reference to the proposed rules submitted by Gulf is that they likewise be promulgated for the Tubb Gas Pool.

MR. COUCH: I may supplement my statement on the Ohio. I had directed my remarks to the Blinebry. In view of the fact evidence has been presented on that pool and those involved in the case and not the Tubb, based on the information available to us, substantially the same recommendations would apply to the Tubb Gas Pool, and we find ourselves in somewhat the same situation as Stanolind with reference to completions in the Tubb zone. That is, we have one well that has perforations below the vertical limits of the Tubb Gas Pool. We would like to see any pool rules adopted for the Tubb to redefine the vertical limits, so that such a well would be in compliance.

MR. MACEY: Providing it isn't completed down into the

Drinkard gas cap?

MR. COOCH: That would be the limitation.

MR. MACEY: Anyone else?

MR. YOST: Mr. Macey, as far as the Commission's staff is concerned, the testimony is directed merely to the Blinebry, not to the Tubb.

MR. MACEY: Do you have anything further on any of the other cases?

MR. STANLEY: I might make a statement here. We have, but not completely, studied the Tubb pool. The staff feels that it is entirely different from the Blinebry pool. We do not have the complications of fluid and, therefore, if one does study the Tubb Pool we may find that the rules may be entirely different and much simpler than the Blinebry Gas Pool. Therefore, as Mr. Yost mentioned, we don't want our testimony in the Blinebry pool applied to the Tubb.

MR. CAMPBELL: Jack Campbell. I would like to ask a question. I assume there is not going to be any evidence offered in Case 728. The Tubbs, Justics and Byers Gas Pools, even though this has been consolidated, this testimony and evidence all applies to Blinebry only.

MR. MACEY: That is right.

MR. CAMPBELL: May I inquire as to what the status of the -- I assume then that the order now in effect in the Tubb, Byers-Queen Gas Pool will simply remain in effect until the evidence is offered to change it, is that the status of it? The reason I inquire, I have some matters pending effecting the Tubb Pool and

the Blinebry Pool, by way of a dual completion which I have been holding up in anticipation of some possible changes in the order.

MR. MACEY: Mr. Campbell, I think you were very aware of the fact that we have been trying to get evidence in all of the cases for several months now. The only recourse that I can see is for this Commission, as far as I feel about it, to write an order and let it stick for a temporary period on all of these pools and give the companies an opportunity to thoroughly study all of the pools. If we can change them, we will change them, but we don't have any evidence to base any order on, I will guarantee you that, outside of the Blinebry; don't misunderstand me.

MR. CAMPBELL: I don't mean to imply that I would object to the Commission entering an order in the Tubb, Byers-Queen Pools along the same lines that they have entered in the other areas. All I was inquiring for was to see whether I should continue to stand by and wait for that or go ahead and proceed under the present order.

MR. MACEY: I want to ask Mr. Stanley a question before we go any further. I am not sure -- What are we going to do about any proration unit that we have approved greater than 160 acres in the Blinebry? What would be your recommendation, if we limited it to 160 acre proration unit?

MR. STANLEY: I would like to have an opportunity to study that particular unit and then I would probably be able to answer the question.

MR. MACEY: I think that the Commission will probably

enter orders more or less clarifying the existing orders where we feel -- in other words, regardless of whether we have the evidence or not. We will try to do what we think is right. If we are wrong and somebody doesn't like it, they can ask for a rehearing and then they can produce the evidence. We have tried very hard to get the evidence and we haven't gotten it. So I think the only thing we can do is to go ahead and do what we think is right. Does anyone have anything further in these two consolidated cases?

MR. WALKER: Yes, I would like to ask Mr. Campbell or anyone else who would care to answer, the question if we go along in the order that Mr. Macey has outlined, is that going to affect the operations, the present operations, to any great extent?

MR. CAMPBELL: I don't know exactly what Mr. Macey was referring to, unless it was to make the orders in the pools other than the Blinebry, with the modifications perhaps that have been suggested, but on the other three pools, I assume he had in mind something along the same lines that was done in the other gas pools that have previously been designated and new rules were adopted. I don't know. I haven't heard anyone who objected to the same type of rules in the other pools to make them more or less uniform throughout the area around there. There may be some who feel that way, but they have certainly had an opportunity here, it seems to me, to come in and offer evidence if that is the case.

MR. MACEY: Anyone else? If not, we will take the case under advisement. Let's take a short recess.

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public and Court Reporter within and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conversation Commission, at Hobbs, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 22nd day of November, 1954.

Ada Dearnley
NOTARY PUBLIC and COURT REPORTER

My Commission expires:

June 19, 1955.

Register

[illegible] Oil [illegible] 1951 [illegible]

Name		
[illegible]	Rowan Oil Co	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	Rowan Oil Co	[illegible]
[illegible]	[illegible]	Roswell
[illegible]	Skelly	[illegible]
[illegible]	"	Hobbs
[illegible]	"	
[illegible]	"	
[illegible]	[illegible]	Midland
[illegible]	[illegible]	Midland
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	
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[illegible]		[illegible]
[illegible]		[illegible]
[illegible]	[illegible]	[illegible]

ILLEGIBLE

ILLEGIBLE

Name	Representing	Location
T. T. Penny	Gulf	Midland
J. G. Coates	"	Houston
Bill Bates	Texas Co	Midland
W. [illegible]	" "	Houston
Warren Mankin	" "	Fort Worth [illegible]
L. C. White	" "	Santa Fe, NM
N. F. Weaver	" "	Midland
J. A. Schaffer	" "	Midland
Paul [illegible]	" "	Monument, N. M
[illegible]	O.C.C.	Artesia,
Bob [illegible]	The Superior Oil Co	Roswell, N. Mex
[illegible]	Gulf Oil Corp.	Roswell NM
B. A. Plummer	Lone Star Prod Co	Midland Tex
E. D. Anderson	" " " "	" "
E. H. Foster	Phillips "66"	Amarillo Tex
[illegible] Roberts	Phillips "66"	Amarillo Tex
[illegible] Roberts	[illegible] Oil Co.	Midland Tex
W. L. Allen	— — —	Houston, Tex.
[illegible] Merryman	Sun Oil Co	Odessa
[illegible]	Sun Oil Co	Odessa Tex.
W. M. [illegible]	Ohio Oil Co	Hobbs
A. D. [illegible]	" "	"
R. A. Crosby	Hughes Tool Co.	"
Glenn Staley	N. M. Oil & Gas Eng	"
Ross Malone	Gulf	Roswell
[illegible] Newman	"	"
John Ross	"	Ft. Worth
[illegible] McCandl[illegible]	Hu[illegible]	Midland

ILLEGIBLE

Name	Representing	Address
W. E. [illegible]	Service Pipe Line Co.	Midland
C. A. [illegible]	Shell	"
[illegible]	"	[illegible]
[illegible]	"	Midland
[illegible]	[illegible]	[illegible]
[illegible]	"	Roswell
[illegible]	Continental	Hobbs
W. T. [illegible]	Continental Oil	Midland
R. L. Adams	"	"
[illegible]		Ft Worth
Robert [illegible] Lane	Stanolind	Roswell
[illegible]	Shell	Hobbs, N.M.
J. [illegible]	"	"
[illegible]	Atlantic Refg Co	Denver City, Texas
F. [illegible]	Mag Oil Co	Brownfield Tex
[illegible]	"	"
Donald [illegible]	Sun Oil Co.	Odessa
Jerry Eubanks	Sun Oil Co	Odessa
[illegible]	[illegible]	Hobbs.
[illegible]	Ralph Lowe	Midland, Texas
[illegible]	Northern Natural	Omaha
[illegible]	"	"
[illegible]	Permian Basin [illegible]	Hobbs
[illegible]	"	"
Harry [illegible]	Continental Oil Co	Ft Worth
[illegible] Thomson	[illegible] Oil & Gas Co	Dallas
[illegible]	"	Dallas
[illegible]		Hobbs

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[illegible] Springer	[illegible]	[illegible]
[illegible] Springer	[illegible]	[illegible]
[illegible]	[illegible]	
[illegible] Wadsill	[illegible]	[illegible]
W. C. [illegible]	[illegible] Oil Corp	Ft Worth
J. T. Hedrick Jr	Peck Oil Co.	Midland
B. C. Gorham	Shell Oil Co	~~Hobbs~~
[illegible] Potter	OCC	Hobbs
[illegible]	OCC	Hobbs
M. L. Hayes	Phillips	Midland
H. A. Roberts		Hobbs
[illegible]	T.P.C.&O	Hobbs
Carl Ammonett	Permian Basin [illegible]	Omaha Nebr
H. W. Swann	Continental Oil Co	Midland, Tex.
[illegible]	Continental Oil Co	Hobbs
[illegible]	Continental Oil Co	Hobbs
[illegible]	Stanolind Oil + Gas	Ft. Worth
Gerald C Proctor	Shell Oil Co.	Hobbs
Vincent Laster	Anderson-Prichard	Hobbs
[illegible]		
R. C. Lannen	"	"
[illegible] Estes	Cont. Oil Co.	Hobbs
[illegible]	Cont. Oil Co.	Hobbs
[illegible] Smith	"	"
[illegible]	"	"
[illegible]	Humble O + R.	"
[illegible]	The Atlantic Refining Co	Denver City, Texas
[illegible] Wright	Fullerton O. & G. [illegible]	Hobbs
[illegible]	Fullerton Oil [illegible] Corp	Hobbs
	[illegible]	Roswell

NAME	REPRESENTING	[illegible]
[illegible] Hamilton	Standard Oil Co. of Texas	[illegible]
C. Patton	[illegible] Pipeline Co.	Loving [illegible] NM
J. D. [illegible]	Skelly Oil Co.	Hobbs
[illegible]	[illegible] Oil	Hobbs
[illegible] Allen	[illegible]	Roswell, NM
R.S. Christie	Amerada	Tulsa, Okla
J. A. Woodward	—	—
[illegible]	Shell Oil Co. —	Hobbs - NM
[illegible]	—	—
M. Simpson	Texas Gulf Prod Co	Midland Tex
[illegible] M. [illegible]	Humble Oil	Hobbs NM
[illegible]	Sinclair Oil Corp	Hobbs
[illegible]	[illegible]	Hobbs
Don WALKER	GULF OIL	FT. WORTH
R. L. Boss	"	ROSWELL
[illegible] McCampbell	[illegible] Oil Co.	Roswell
ROSS MALONE	GULF OIL	
CHARLES SAPP	WESTERN NAT GAS	HOUSTON
Paul Wright	"	"
[illegible]	"	Midland
[illegible]	El Paso Nat Gas	Houston
[illegible]	"	"
C. L. Corbett	"	Midland
C. N. [illegible]	Western Natural Gas	Midland
John Thomas	"	"
P. E. [illegible]	Sun Oil Co	Midland
NORMAN [illegible]	EL PASO NAT. GAS CO	HOUSTON
[illegible]	"	"
[illegible]	[illegible]	[illegible]

Charles R. Freemer		Self
Geo Schmidt		Duty
Sgt W. Vabaunts	Shell Oil Co	Hobbs
Bill Marshall	Schermerhorn	Hobbs

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